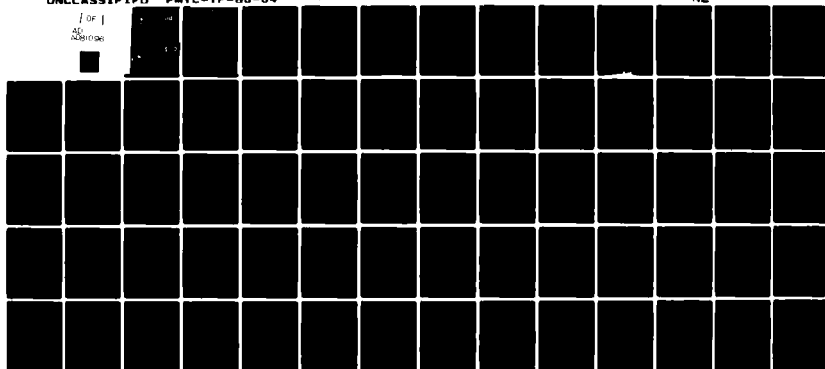


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TIDAL AND LUNAR DATA FOR POINT MUGU, SAN NICOLAS ISLAND, AND TH--ETC(U)
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This report was compiled by Mr. Robert de Villedel with the assistance of Mr. Richard W. Elgen and Mr. Stephen Williams.

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INTRODUCTION

This publication combines into a single source all tidal and lunar data for operational locations of the Pacific Missile Test Center for use in Calendar Year 1980.

The data presentations are in two main divisions: one for Point Mugu and San Nicolas Island, and the other for the Barking Sands area. Within each division, the times of moonrise and moonset and tidal data are given. An appendix provides information regarding lunar phases. Since all such data change from year to year, this publication will be reissued annually.

Sunrise-sunset times for these locations, and associated solar data which do not change significantly from year to year, are issued as a single, permanent publication. Further information regarding any of these data may be obtained from the Geophysics Division of the Range Operations Department.

DATA SOURCE AND TIME REFERENCES

The data given here have been prepared from information contained in Tide Tables for the West Coast of North and South America including the Hawaiian Islands, 1980.*

For Point Mugu and San Nicolas Island, all times listed are Pacific Standard Time (PST); add eight hours to obtain Greenwich Mean Time (GMT or Z).**

For the Barking Sands area, all times listed are Alaska-Hawaii Standard Time (AHST); add 10 hours to obtain GMT. Daylight Savings Time is not observed in Hawaii.

*National Ocean Survey, Tide Tables for the West Coast of North and South America Including the Hawaiian Islands, 1980. Washington, D.C., GPO, 1979.

**When Daylight Saving Time (PDT) is in effect, 1 hour is to be added to the times given. In 1980, Pacific Daylight Time is scheduled to commence at 0200 PST on Sunday, 27 April (add 1 hour), and to end at 0200 PDT on Sunday, 26 October (subtract 1 hour).

TIDAL DATA

The ranges of tidal heights that may be expected at Point Mugu and San Nicolas Island are shown in table 1. The range of heights for the primary harbor in the Barking Sands area, Port Allen, is shown in table 2. The times and heights of high and low tides for 1980 at Point Mugu are given in the even-numbered tables 4 through 26, and at San Nicolas Island in the odd-numbered tables 5 through 27. Similar tide data for Port Allen are given in tables 29 through 40.

Table 1. Tidal Ranges for Point Mugu and San Nicolas Island

| Tidal Levels | Point Mugu | San Nicolas Island |
|------------------------|---------------|--------------------|
| | Height (Feet) | Height (Feet) |
| Extreme high water | 7.3 | 6.7 |
| Mean higher high water | 5.3 | 4.9 |
| Mean high water | 4.5 | 4.1 |
| Mean tide level* | 2.7 | 2.5 |
| Mean low water | 0.9 | 0.8 |
| Mean lower low water | 0.0 | 0.0 |
| Extreme low water | -2.0 | -1.8 |

*The mean tide level is also called mean sea level.

Table 2. Tidal Ranges for Port Allen

| Tidal Levels | Height (Feet) |
|------------------------|---------------|
| Extreme high water | 2.6 |
| Mean higher high water | 1.6 |
| Mean high water | 1.2 |
| Mean tide level* | 0.7 |
| Mean low water | 0.2 |
| Mean lower low water | 0.0 |
| Extreme low water | -0.4 |

*The mean tide level is also called mean sea level.

Tidal graphs prepared from the Point Mugu data are presented in figures 1 through 12, and graphs prepared from the Port Allen tables are presented in figures 13 through 24. (Because of their close similarity to the Point Mugu graphs, graphical presentations of the San Nicolas Island data are not included in this publication.)

These tables list the times and heights of high and low tide for each month of the year and chronologically through each day. The heights are all measured from mean lower low water (see tables 1 and 2) and are values for a sea unaffected by wind waves or swell. The height and character of the sea surface are influenced by factors other than the predictable positions of the moon and sun, and is thus likely to be higher or lower than computed values may indicate. Information regarding the height of the tide at any time will be found in appendix A.

LUNAR DATA

Times of moonrise and moonset for the Point Mugu-San Nicolas Island area in 1980 are given in table 3, and for the Barking Sands area in table 28, preceding the tidal data for the respective stations. Information regarding the phases of the moon in 1980 will be found in appendix B.

Table 3. Moonrise and Moonset, Point Mugu, California, 1980

| Date | January | | February | | March | | April | | May | | June | | Date |
|------|---------|------|----------|------|-------|------|-------|------|------|------|------|------|------|
| | Rise | Set | Rise | Set | Rise | Set | Rise | Set | Rise | Set | Rise | Set | |
| 1 | 1647 | 0612 | 1816 | 0712 | 1758 | 0623 | 1927 | 0632 | 2008 | 0616 | 2142 | 0719 | 1 |
| 2 | 1741 | 0704 | 1911 | 0748 | 1852 | 0656 | 2022 | 0704 | 2104 | 0656 | 2231 | 0817 | 2 |
| 3 | 1835 | 0752 | 2005 | 0822 | 1945 | 0727 | 2117 | 0739 | 2159 | 0741 | 2316 | 0919 | 3 |
| 4 | 1931 | 0835 | 2058 | 0854 | 2038 | 0758 | 2212 | 0816 | 2253 | 0830 | 2358 | 1022 | 4 |
| 5 | 2025 | 0914 | 2151 | 0926 | 2132 | 0830 | 2308 | 0857 | 2344 | 0925 | --- | 1126 | 5 |
| 6 | 2120 | 0949 | 2245 | 0957 | 2227 | 0903 | --- | 0943 | --- | 1023 | 0038 | 1232 | 6 |
| 7 | 2213 | 1022 | 2339 | 1029 | 2322 | 0938 | 0003 | 1034 | 0031 | 1125 | 0116 | 1337 | 7 |
| 8 | 2306 | 1054 | --- | 1103 | --- | 1017 | 0056 | 1131 | 0116 | 1229 | 0154 | 1444 | 8 |
| 9 | --- | 1125 | 0034 | 1140 | 0018 | 1100 | 0146 | 1232 | 0157 | 1335 | 0233 | 1551 | 9 |
| 10 | 0000 | 1156 | 0131 | 1221 | 0114 | 1149 | 0234 | 1336 | 0237 | 1443 | 0315 | 1657 | 10 |
| 11 | 0054 | 1230 | 0229 | 1308 | 0210 | 1243 | 0319 | 1444 | 0317 | 1551 | 0359 | 1803 | 11 |
| 12 | 0150 | 1306 | 0327 | 1401 | 0303 | 1344 | 0401 | 1553 | 0356 | 1659 | 0448 | 1905 | 12 |
| 13 | 0247 | 1346 | 0424 | 1500 | 0355 | 1449 | 0443 | 1703 | 0438 | 1808 | 0541 | 2003 | 13 |
| 14 | 0346 | 1431 | 0518 | 1605 | 0443 | 1557 | 0523 | 1813 | 0522 | 1916 | 0636 | 2056 | 14 |
| 15 | 0446 | 1522 | 0609 | 1714 | 0528 | 1707 | 0605 | 1923 | 0610 | 2021 | 0734 | 2142 | 15 |
| 16 | 0545 | 1619 | 0656 | 1824 | 0611 | 1818 | 0649 | 2031 | 0701 | 2121 | 0831 | 2223 | 16 |
| 17 | 0641 | 1722 | 0740 | 1934 | 0653 | 1929 | 0735 | 2137 | 0755 | 2216 | 0928 | 2300 | 17 |
| 18 | 0734 | 1829 | 0822 | 2043 | 0734 | 2038 | 0823 | 2238 | 0851 | 2305 | 1023 | 2334 | 18 |
| 19 | 0822 | 1937 | 0902 | 2151 | 0816 | 2146 | 0915 | 2334 | 0948 | 2348 | 1118 | --- | 19 |
| 20 | 0906 | 2045 | 0942 | 2257 | 0900 | 2251 | 1009 | --- | 1044 | --- | 1211 | 0006 | 20 |
| 21 | 0947 | 2153 | 1023 | --- | 0946 | 2352 | 1104 | 0025 | 1139 | 0026 | 1305 | 0036 | 21 |
| 22 | 1026 | 2258 | 1106 | 0001 | 1034 | --- | 1159 | 0110 | 1233 | 0101 | 1359 | 0107 | 22 |
| 23 | 1105 | --- | 1151 | 0102 | 1125 | 0050 | 1253 | 0150 | 1327 | 0133 | 1453 | 0139 | 23 |
| 24 | 1143 | 0003 | 1239 | 0201 | 1218 | 0142 | 1348 | 0226 | 1420 | 0205 | 1549 | 0213 | 24 |
| 25 | 1224 | 0106 | 1330 | 0255 | 1311 | 0229 | 1441 | 0300 | 1514 | 0235 | 1646 | 0250 | 25 |
| 26 | 1307 | 0208 | 1422 | 0345 | 1405 | 0311 | 1534 | 0332 | 1608 | 0306 | 1744 | 0332 | 26 |
| 27 | 1352 | 0308 | 1516 | 0430 | 1500 | 0350 | 1628 | 0403 | 1704 | 0339 | 1841 | 0418 | 27 |
| 28 | 1441 | 0405 | 1610 | 0511 | 1553 | 0425 | 1722 | 0434 | 1800 | 0415 | 1936 | 0511 | 28 |
| 29 | 1533 | 0458 | 1705 | 0549 | 1647 | 0458 | 1816 | 0505 | 1857 | 0454 | 2027 | 0608 | 29 |
| 30 | 1627 | 0547 | --- | --- | 1740 | 0529 | 1912 | 0539 | 1954 | 0537 | 2115 | 0710 | 30 |
| 31 | 1722 | 0631 | --- | --- | 1833 | 0600 | --- | --- | 2050 | 0626 | --- | --- | 31 |

| Date | July | | August | | September | | October | | November | | December | | Date |
|------|------|------|--------|------|-----------|------|---------|------|----------|------|----------|------|------|
| | Rise | Set | Rise | Set | Rise | Set | Rise | Set | Rise | Set | Rise | Set | |
| 1 | 2159 | 0814 | 2235 | 1028 | 2325 | 1239 | 2358 | 1324 | 0040 | 1410 | 0116 | 1347 | 1 |
| 2 | 2239 | 0919 | 2314 | 1134 | --- | 1339 | --- | 1412 | 0135 | 1443 | 0210 | 1417 | 2 |
| 3 | 2318 | 1025 | 2355 | 1239 | 0015 | 1436 | 0054 | 1455 | 0229 | 1514 | 0303 | 1448 | 3 |
| 4 | 2355 | 1130 | --- | 1343 | 0107 | 1527 | 0150 | 1533 | 0323 | 1545 | 0357 | 1520 | 4 |
| 5 | --- | 1235 | 0039 | 1445 | 0203 | 1613 | 0245 | 1608 | 0416 | 1615 | 0452 | 1555 | 5 |
| 6 | 0033 | 1341 | 0127 | 1544 | 0259 | 1654 | 0340 | 1640 | 0510 | 1646 | 0547 | 1633 | 6 |
| 7 | 0113 | 1446 | 0218 | 1639 | 0355 | 1732 | 0434 | 1711 | 0604 | 1719 | 0643 | 1716 | 7 |
| 8 | 0155 | 1550 | 0312 | 1729 | 0451 | 1806 | 0528 | 1742 | 0659 | 1755 | 0738 | 1803 | 8 |
| 9 | 0241 | 1653 | 0408 | 1814 | 0545 | 1838 | 0621 | 1812 | 0754 | 1835 | 0831 | 1855 | 9 |
| 10 | 0331 | 1752 | 0505 | 1855 | 0640 | 1909 | 0715 | 1844 | 0848 | 1919 | 0921 | 1952 | 10 |
| 11 | 0424 | 1846 | 0602 | 1932 | 0733 | 1940 | 0809 | 1918 | 0942 | 2007 | 1008 | 2051 | 11 |
| 12 | 0520 | 1935 | 0658 | 2005 | 0826 | 2011 | 0903 | 1955 | 1033 | 2100 | 1051 | 2153 | 12 |
| 13 | 0618 | 2018 | 0753 | 2037 | 0920 | 2043 | 0958 | 2036 | 1122 | 2157 | 1131 | 2256 | 13 |
| 14 | 0715 | 2058 | 0846 | 2108 | 1014 | 2118 | 1052 | 2121 | 1207 | 2258 | 1209 | --- | 14 |
| 15 | 0812 | 2133 | 0940 | 2138 | 1108 | 2156 | 1145 | 2211 | 1250 | --- | 1246 | 0001 | 15 |
| 16 | 0907 | 2206 | 1033 | 2210 | 1203 | 2239 | 1236 | 2307 | 1330 | 0001 | 1323 | 0106 | 16 |
| 17 | 1002 | 2237 | 1127 | 2244 | 1258 | 2327 | 1324 | --- | 1409 | 0106 | 1402 | 0212 | 17 |
| 18 | 1055 | 2307 | 1222 | 2320 | 1351 | --- | 1410 | 0006 | 1447 | 0212 | 1443 | 0320 | 18 |
| 19 | 1148 | 2338 | 1317 | --- | 1443 | 0021 | 1453 | 0110 | 1527 | 0321 | 1529 | 0429 | 19 |
| 20 | 1242 | --- | 1413 | 0001 | 1532 | 0120 | 1535 | 0216 | 1608 | 0430 | 1619 | 0537 | 20 |
| 21 | 1337 | 0011 | 1509 | 0047 | 1619 | 0224 | 1615 | 0324 | 1653 | 0541 | 1714 | 0642 | 21 |
| 22 | 1433 | 0046 | 1604 | 0139 | 1702 | 0331 | 1655 | 0434 | 1742 | 0651 | 1813 | 0743 | 22 |
| 23 | 1530 | 0125 | 1656 | 0237 | 1744 | 0440 | 1737 | 0545 | 1836 | 0759 | 1914 | 0837 | 23 |
| 24 | 1628 | 0209 | 1745 | 0340 | 1825 | 0550 | 1821 | 0657 | 1933 | 0902 | 2014 | 0925 | 24 |
| 25 | 1724 | 0259 | 1830 | 0446 | 1906 | 0701 | 1908 | 0807 | 2032 | 0959 | 2113 | 1007 | 25 |
| 26 | 1818 | 0354 | 1912 | 0555 | 1948 | 0812 | 1958 | 0916 | 2131 | 1049 | 2211 | 1044 | 26 |
| 27 | 1908 | 0455 | 1953 | 0704 | 2032 | 0921 | 2052 | 1019 | 2230 | 1132 | 2306 | 1117 | 27 |
| 28 | 1955 | 0600 | 2033 | 0813 | 2119 | 1028 | 2149 | 1117 | 2327 | 1211 | --- | 1148 | 28 |
| 29 | 2038 | 0706 | 2113 | 0922 | 2209 | 1132 | 2246 | 1209 | --- | 1245 | 0001 | 1219 | 29 |
| 30 | 2118 | 0814 | 2154 | 1029 | 2303 | 1231 | 2343 | 1254 | 0022 | 1317 | 0054 | 1249 | 30 |
| 31 | 2157 | 0921 | 2238 | 1135 | --- | --- | --- | 1335 | --- | --- | 0148 | 1320 | 31 |

TABLE 4
POINT MUGO TIDES
34 DEG 06 MIN N, 119 DEG 06 MIN W - OCEAN PIER JANUARY 1980

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0150 | 1.8 | 0759 | 6.4 | 1516 | -1.0 | 2133 | 3.9 |
| 2 | 0230 | 1.9 | 0834 | 6.3 | 1553 | -1.0 | 2215 | 3.9 |
| 3 | 0307 | 2.0 | 0909 | 6.1 | 1627 | -0.8 | 2253 | 3.9 |
| 4 | 0344 | 2.2 | 0944 | 5.7 | 1703 | -0.5 | 2332 | 3.8 |
| 5 | 0423 | 2.3 | 1019 | 5.3 | 1739 | -0.2 | --- | --- |
| 6 | 0501 | 3.8 | 0508 | 2.5 | 1055 | 4.9 | 1812 | 0.2 |
| 7 | 0540 | 3.8 | 0601 | 2.5 | 1137 | 4.3 | 1854 | 0.6 |
| 8 | 0619 | 3.8 | 0715 | 2.6 | 1226 | 3.7 | 1936 | 1.0 |
| 9 | 0658 | 3.9 | 0853 | 2.5 | 1339 | 3.2 | 2024 | 1.4 |
| 10 | 0735 | 4.2 | 1032 | 2.1 | 1528 | 2.9 | 2117 | 1.7 |
| 11 | 0822 | 4.4 | 1138 | 1.5 | 1710 | 2.8 | 2215 | 1.9 |
| 12 | 0903 | 4.8 | 1224 | 0.9 | 1821 | 3.0 | 2312 | 2.0 |
| 13 | 0942 | 5.2 | 1306 | 0.3 | 1914 | 3.3 | 2357 | 2.0 |
| 14 | 1021 | 5.6 | 1340 | -0.3 | 1945 | 3.5 | --- | --- |
| 15 | 1100 | 2.0 | 0657 | 6.0 | 1416 | -0.8 | 2032 | 3.8 |
| 16 | 1124 | 1.9 | 0736 | 6.3 | 1452 | -1.1 | 2113 | 4.0 |
| 17 | 1210 | 1.7 | 0815 | 6.5 | 1530 | -1.4 | 2149 | 4.1 |
| 18 | 1252 | 1.6 | 0857 | 6.6 | 1609 | -1.4 | 2229 | 4.3 |
| 19 | 1340 | 1.6 | 0940 | 6.4 | 1649 | -1.2 | 2313 | 4.4 |
| 20 | 1431 | 1.6 | 1028 | 5.9 | 1732 | -0.9 | 2359 | 4.5 |
| 21 | 1529 | 1.6 | 1120 | 5.3 | 1817 | -0.6 | --- | --- |
| 22 | 0050 | 4.6 | 0640 | 1.7 | 1222 | 4.5 | 1906 | 0.2 |
| 23 | 0145 | 4.7 | 0806 | 1.6 | 1338 | 3.8 | 2001 | 0.9 |
| 24 | 0244 | 4.9 | 0944 | 1.3 | 1522 | 3.2 | 2106 | 1.4 |
| 25 | 0351 | 5.1 | 1110 | 0.7 | 1707 | 3.1 | 2216 | 1.7 |
| 26 | 0451 | 5.4 | 1214 | 0.2 | 1829 | 3.3 | 2322 | 1.9 |
| 27 | 0544 | 5.6 | 1309 | -0.3 | 1925 | 3.5 | --- | --- |
| 28 | 0620 | 1.9 | 0632 | 5.8 | 1351 | -0.7 | 2018 | 3.7 |
| 29 | 0106 | 1.9 | 0714 | 6.0 | 1430 | -0.8 | 2049 | 3.9 |
| 30 | 0144 | 1.8 | 0750 | 6.0 | 1502 | -0.9 | 2120 | 4.0 |
| 31 | 0224 | 1.8 | 0825 | 5.9 | 1533 | -0.8 | 2149 | 4.0 |

TABLE 5
SAN NICOLAS ISLAND TIDES
33 DEG 16 MIN N, 119 DEG 30 MIN W - CENTRAL PART NF COAST JANUARY 1980

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0200 | 1.6 | 0806 | 5.9 | 1526 | -0.9 | 2140 | 3.6 |
| 2 | 0240 | 1.7 | 0841 | 5.8 | 1603 | -0.9 | 2222 | 3.6 |
| 3 | 0317 | 1.4 | 0916 | 5.6 | 1637 | -0.7 | 2300 | 3.6 |
| 4 | 0354 | 2.0 | 0951 | 5.3 | 1713 | -0.5 | 2339 | 3.5 |
| 5 | 0433 | 2.1 | 1026 | 4.9 | 1749 | -0.2 | --- | --- |
| 6 | 0511 | 3.5 | 0518 | 2.3 | 1102 | 4.6 | 1827 | 0.2 |
| 7 | 0107 | 3.5 | 0611 | 2.4 | 1144 | 4.0 | 1904 | 0.5 |
| 8 | 0155 | 3.5 | 0725 | 2.5 | 1233 | 3.5 | 1946 | 0.9 |
| 9 | 0244 | 3.6 | 0903 | 2.3 | 1346 | 3.0 | 2034 | 1.3 |
| 10 | 0342 | 3.9 | 1042 | 1.9 | 1535 | 2.7 | 2127 | 1.5 |
| 11 | 0429 | 4.1 | 1148 | 1.4 | 1717 | 2.6 | 2225 | 1.7 |
| 12 | 0510 | 4.5 | 1234 | 0.8 | 1828 | 2.4 | 2322 | 1.8 |
| 13 | 0549 | 4.8 | 1316 | 0.3 | 1921 | 3.1 | 0007 | 1.4* |
| 14 | 0626 | 5.2 | 1350 | -0.3 | 2002 | 3.3 | --- | --- |
| 15 | 0052 | 1.8 | 0704 | 5.6 | 1426 | -0.7 | 2039 | 3.5 |
| 16 | 0134 | 1.7 | 0743 | 5.4 | 1502 | -1.0 | 2120 | 3.7 |
| 17 | 0220 | 1.5 | 0822 | 6.0 | 1540 | -1.3 | 2156 | 3.8 |
| 18 | 0302 | 1.5 | 0904 | 6.1 | 1619 | -1.3 | 2236 | 4.0 |
| 19 | 0350 | 1.5 | 0947 | 5.9 | 1659 | -1.1 | 2320 | 4.1 |
| 20 | 0441 | 1.5 | 1035 | 5.5 | 1742 | -0.8 | 0006 | 4.2* |
| 21 | 0534 | 1.5 | 1127 | 4.9 | 1827 | -0.4 | --- | --- |
| 22 | 0057 | 4.3 | 0650 | 1.5 | 1229 | 4.2 | 1916 | 6.2 |
| 23 | 0152 | 4.4 | 0816 | 1.5 | 1345 | 3.5 | 2011 | 6.4 |
| 24 | 0255 | 4.6 | 0955 | 1.2 | 1529 | 3.0 | 2116 | 1.3 |
| 25 | 0354 | 4.7 | 1120 | 0.6 | 1714 | 2.9 | 2226 | 1.5 |
| 26 | 0458 | 5.0 | 1224 | 0.2 | 1836 | 3.1 | 2332 | 1.7 |
| 27 | 0551 | 5.2 | 1319 | -0.3 | 1932 | 3.3 | --- | --- |
| 28 | 0030 | 1.7 | 0639 | 5.4 | 1401 | -0.5 | 2017 | 3.5 |
| 29 | 0116 | 1.7 | 0721 | 5.6 | 1440 | -0.7 | 2056 | 3.6 |
| 30 | 0154 | 1.6 | 0757 | 5.6 | 1512 | -0.8 | 2127 | 3.7 |
| 31 | 0234 | 1.6 | 0832 | 5.5 | 1543 | -0.7 | 2154 | 3.7 |

* -- TIME OCCURS ON NEXT DATE.

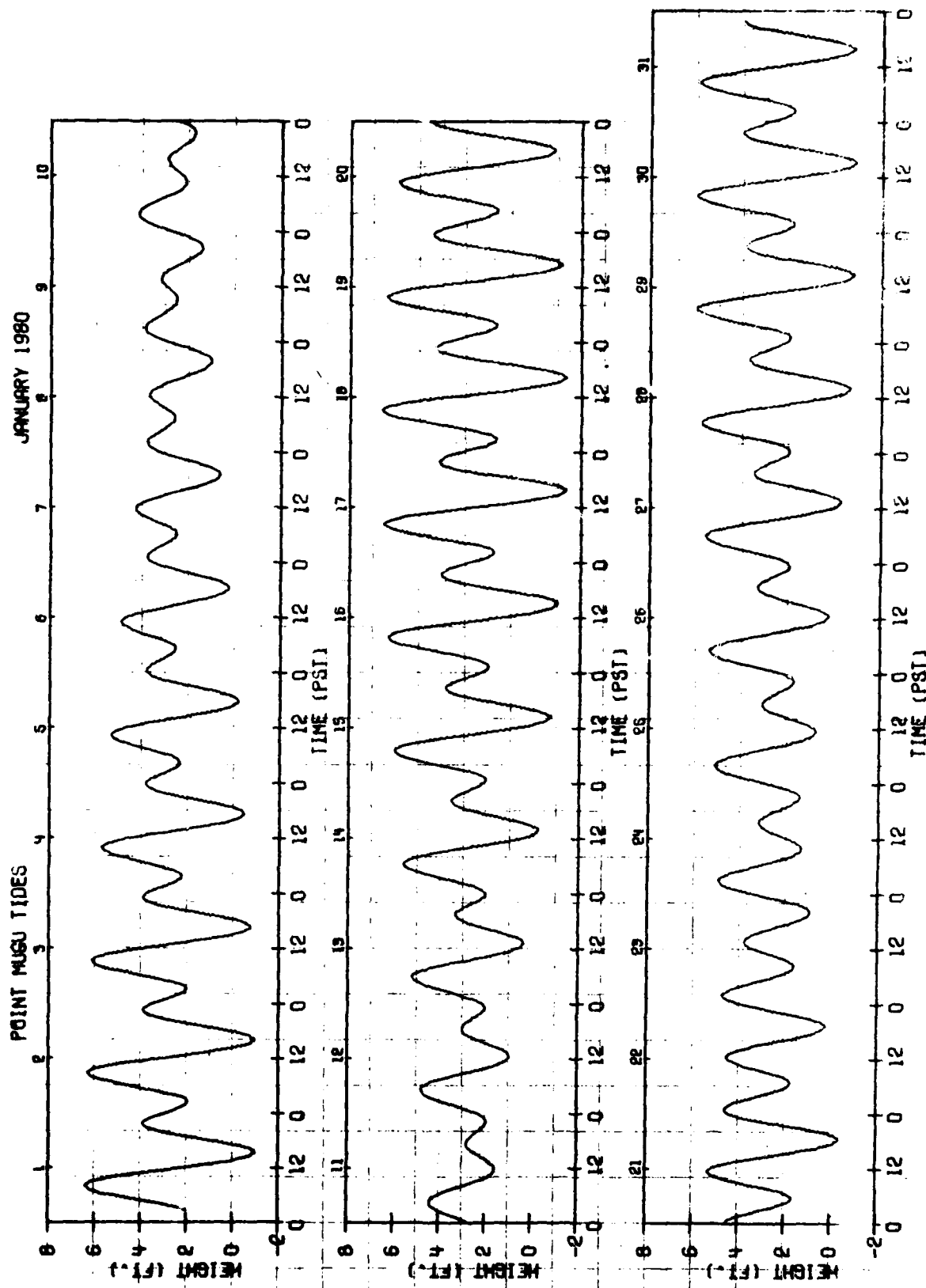


Figure 1. Tidal Graph for Point Mugu, January 1980.

TABLE 6
POINT MUGU TIDES
34 DEG 06 MIN N - 119 DEG 06 MIN W - OCEAN PIER FEBRUARY 1940

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0254 | 1.7 | 0857 | 5.8 | 1601 | -0.7 | 2214 | 4.0 |
| 2 | 0334 | 1.7 | 0924 | 5.6 | 1630 | -0.4 | 2248 | 4.0 |
| 3 | 0409 | 1.7 | 1001 | 5.2 | 1659 | -0.1 | 2317 | 4.0 |
| 4 | 0447 | 1.8 | 1032 | 4.8 | 1726 | 0.3 | 2349 | 4.0 |
| 5 | 0527 | 1.9 | 1109 | 4.3 | 1755 | 0.7 | --- | --- |
| 6 | 0623 | 4.0 | 0621 | 2.0 | 1151 | 3.7 | 1825 | 1.1 |
| 7 | 0105 | 4.0 | 0730 | 2.0 | 1246 | 3.1 | 1858 | 1.6 |
| 8 | 0154 | 4.0 | 0912 | 1.9 | 1429 | 2.6 | 1944 | 2.0 |
| 9 | 0301 | 4.2 | 1049 | 1.5 | 1649 | 2.6 | 2103 | 2.3 |
| 10 | 0404 | 4.5 | 1151 | 0.9 | 1816 | 2.9 | 2229 | 2.4 |
| 11 | 0501 | 4.9 | 1237 | 0.2 | 1902 | 3.2 | 2338 | 2.2 |
| 12 | 0550 | 5.3 | 1316 | -0.4 | 1938 | 3.6 | --- | --- |
| 13 | 0628 | 2.0 | 0638 | 5.8 | 1352 | -0.9 | 2010 | 3.9 |
| 14 | 0117 | 1.6 | 0721 | 6.2 | 1429 | -1.2 | 2045 | 4.2 |
| 15 | 0201 | 1.3 | 0806 | 6.4 | 1506 | -1.4 | 2120 | 4.5 |
| 16 | 0247 | 1.0 | 0848 | 6.4 | 1545 | -1.4 | 2155 | 4.8 |
| 17 | 0335 | 0.7 | 0935 | 6.2 | 1623 | -1.1 | 2234 | 4.9 |
| 18 | 0426 | 0.6 | 1024 | 5.7 | 1703 | -0.6 | 2316 | 5.0 |
| 19 | 0521 | 0.7 | 1114 | 5.0 | 1742 | 0.0 | --- | --- |
| 20 | 0602 | 5.0 | 0624 | 0.8 | 1217 | 4.2 | 1829 | 0.7 |
| 21 | 0055 | 4.9 | 0742 | 0.9 | 1335 | 3.4 | 1918 | 1.4 |
| 22 | 0156 | 4.8 | 0916 | 0.8 | 1524 | 3.0 | 2027 | 1.9 |
| 23 | 0310 | 4.4 | 1048 | 0.5 | 1718 | 3.1 | 2203 | 2.2 |
| 24 | 0426 | 4.9 | 1159 | 0.1 | 1832 | 3.4 | 2323 | 2.2 |
| 25 | 0531 | 5.1 | 1252 | -0.3 | 1922 | 3.7 | --- | --- |
| 26 | 0623 | 2.0 | 0620 | 5.3 | 1332 | -0.5 | 1957 | 3.9 |
| 27 | 0104 | 1.8 | 0707 | 5.4 | 1409 | -0.6 | 2026 | 4.0 |
| 28 | 0144 | 1.6 | 0741 | 5.5 | 1439 | -0.6 | 2052 | 4.2 |
| 29 | 0214 | 1.4 | 0813 | 5.5 | 1504 | -0.5 | 2116 | 4.2 |

TABLE 7
SAN NICOLAS ISLAND TIDES
33 DEG 16 MIN N - 119 DEG 30 MIN W - CENTRAL PART NE COAST FEBRUARY 1940

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0304 | 1.5 | 0904 | 5.4 | 1611 | -0.6 | 2225 | 3.7 |
| 2 | 0344 | 1.5 | 0936 | 5.2 | 1640 | -0.4 | 2255 | 3.7 |
| 3 | 0414 | 1.5 | 1008 | 4.8 | 1709 | -0.1 | 2324 | 3.7 |
| 4 | 0457 | 1.6 | 1039 | 4.5 | 1736 | 0.3 | 2356 | 3.7 |
| 5 | 0537 | 1.7 | 1116 | 4.0 | 1805 | 0.6 | --- | --- |
| 6 | 0630 | 3.7 | 0631 | 1.8 | 1158 | 2.5 | 1835 | 1.0 |
| 7 | 0112 | 3.7 | 0740 | 1.8 | 1253 | 2.9 | 1904 | 1.5 |
| 8 | 0205 | 3.7 | 0922 | 1.7 | 1436 | 2.5 | 1954 | 1.4 |
| 9 | 0304 | 3.9 | 1059 | 1.4 | 1656 | 2.5 | 2113 | 2.1 |
| 10 | 0411 | 4.2 | 1201 | 0.8 | 1823 | 2.7 | 2239 | 2.2 |
| 11 | 0504 | 4.6 | 1247 | 0.2 | 1909 | 3.0 | 2344 | 2.0 |
| 12 | 0557 | 4.9 | 1326 | -0.4 | 1945 | 3.4 | --- | --- |
| 13 | 0638 | 1.8 | 0645 | 5.4 | 1402 | -0.8 | 2017 | 3.6 |
| 14 | 0127 | 1.5 | 0728 | 5.7 | 1439 | -1.1 | 2052 | 3.9 |
| 15 | 0211 | 1.2 | 0813 | 5.9 | 1516 | -1.3 | 2127 | 4.2 |
| 16 | 0257 | 0.9 | 0855 | 5.9 | 1555 | -1.3 | 2202 | 4.5 |
| 17 | 0345 | 0.6 | 0942 | 5.7 | 1633 | -1.0 | 2241 | 4.6 |
| 18 | 0436 | 0.5 | 1031 | 5.3 | 1713 | -0.5 | 2323 | 4.6 |
| 19 | 0531 | 0.6 | 1121 | 4.6 | 1752 | 0.0 | --- | --- |
| 20 | 0604 | 4.6 | 0634 | 0.7 | 1224 | 3.4 | 1839 | 0.6 |
| 21 | 0102 | 4.6 | 0752 | 0.8 | 1342 | 3.2 | 1924 | 1.3 |
| 22 | 0203 | 4.5 | 0826 | 0.7 | 1531 | 2.8 | 2037 | 1.7 |
| 23 | 0317 | 4.5 | 0954 | 0.5 | 1725 | 2.9 | 2213 | 2.0 |
| 24 | 0433 | 4.6 | 1209 | 0.1 | 1839 | 3.2 | 2333 | 2.0 |
| 25 | 0534 | 4.7 | 1302 | -0.3 | 1929 | 3.5 | --- | --- |
| 26 | 0633 | 1.4 | 0627 | 4.4 | 1342 | -0.5 | 2004 | 3.6 |
| 27 | 0114 | 1.6 | 0709 | 5.0 | 1419 | -0.5 | 2033 | 3.7 |
| 28 | 0156 | 1.5 | 0748 | 5.1 | 1449 | -0.5 | 2059 | 3.9 |
| 29 | 0224 | 1.3 | 0820 | 5.1 | 1514 | -0.5 | 2121 | 3.9 |

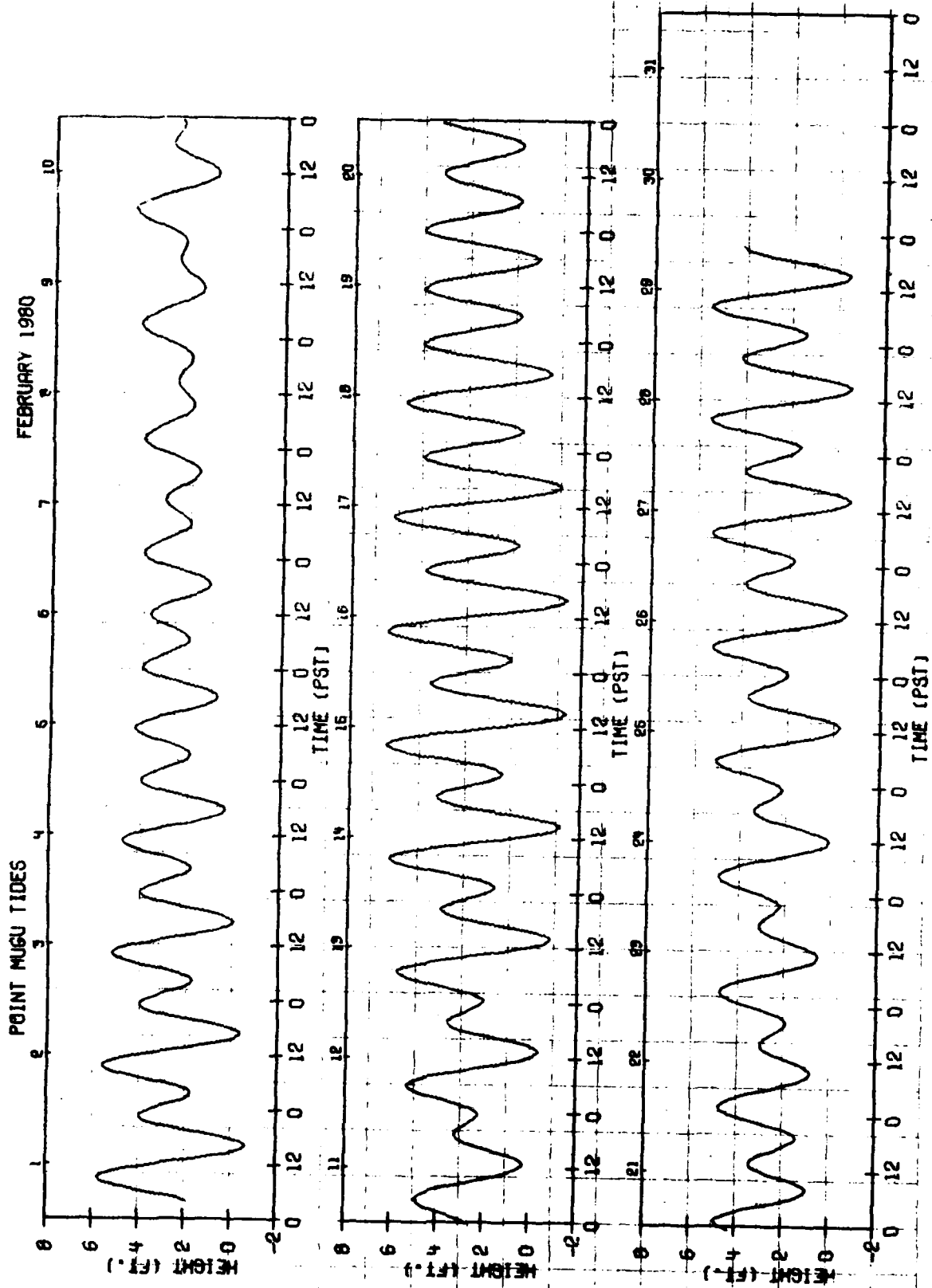


Figure 2. Tidal Graph for Point Mugu, February 1980.

TABLE 8

POINT MUGU TIDES

34 DEG 06 MIN N, 119 DEG 06 MIN W - OCEAN PIER

MARCH 1940

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0244 | 1.2 | 0845 | 5.4 | 1529 | -0.3 | 2139 | 4.3 |
| 2 | 0320 | 1.1 | 0915 | 5.2 | 1554 | -0.1 | 2200 | 4.4 |
| 3 | 0352 | 1.0 | 0945 | 4.9 | 1614 | 0.2 | 2227 | 4.4 |
| 4 | 0424 | 1.0 | 1019 | 4.5 | 1641 | 0.6 | 2251 | 4.4 |
| 5 | 0503 | 1.1 | 1051 | 4.0 | 1705 | 1.0 | 2317 | 4.3 |
| 6 | 0544 | 1.2 | 1135 | 3.5 | 1727 | 1.4 | 2353 | 4.2 |
| 7 | 0643 | 1.3 | 1227 | 3.0 | 1756 | 1.4 | --- | --- |
| 8 | 0731 | 4.2 | 0803 | 1.4 | 1409 | 2.6 | 1834 | 2.2 |
| 9 | 0135 | 4.1 | 0943 | 1.1 | 1646 | 2.6 | 2000 | 2.5 |
| 10 | 0303 | 4.2 | 1106 | 0.7 | 1800 | 3.0 | 2204 | 2.5 |
| 11 | 0422 | 4.5 | 1200 | 0.1 | 1837 | 3.4 | 2325 | 2.3 |
| 12 | 0527 | 5.0 | 1244 | -0.4 | 1909 | 3.8 | --- | --- |
| 13 | 0621 | 1.8 | 0620 | 5.4 | 1321 | -0.8 | 1941 | 4.2 |
| 14 | 0104 | 1.2 | 0706 | 5.8 | 1400 | -1.0 | 2012 | 4.7 |
| 15 | 0154 | 0.6 | 0754 | 6.0 | 1437 | -1.1 | 2044 | 5.0 |
| 16 | 0240 | 0.2 | 0839 | 6.0 | 1515 | -0.9 | 2120 | 5.3 |
| 17 | 0324 | -0.2 | 0928 | 5.7 | 1551 | -0.5 | 2157 | 5.5 |
| 18 | 0414 | -0.3 | 1017 | 5.2 | 1629 | 0.0 | 2237 | 5.5 |
| 19 | 0510 | -0.3 | 1112 | 4.5 | 1704 | 0.6 | 2320 | 5.4 |
| 20 | 0604 | -0.1 | 1215 | 3.8 | 1752 | 1.3 | --- | --- |
| 21 | 0004 | 5.1 | 0718 | 0.2 | 1335 | 3.3 | 1846 | 1.9 |
| 22 | 0104 | 4.8 | 0847 | 0.3 | 1530 | 3.1 | 2004 | 2.4 |
| 23 | 0227 | 4.5 | 1017 | 0.3 | 1715 | 3.3 | 2158 | 2.5 |
| 24 | 0353 | 4.4 | 1128 | 0.1 | 1815 | 3.6 | 2322 | 2.3 |
| 25 | 0509 | 4.5 | 1221 | -0.1 | 1857 | 3.9 | --- | --- |
| 26 | 0620 | 1.4 | 0605 | 4.7 | 1303 | -0.2 | 1926 | 4.1 |
| 27 | 0103 | 1.6 | 0650 | 4.8 | 1336 | -0.2 | 1951 | 4.3 |
| 28 | 0135 | 1.2 | 0725 | 4.8 | 1402 | -0.1 | 2013 | 4.4 |
| 29 | 0206 | 0.9 | 0759 | 4.8 | 1430 | 0.0 | 2034 | 4.6 |
| 30 | 0237 | 0.7 | 0830 | 4.8 | 1452 | 0.2 | 2055 | 4.7 |
| 31 | 0306 | 0.5 | 0902 | 4.6 | 1514 | 0.4 | 2117 | 4.8 |

TABLE 9

SAN NICOLAS ISLAND TIDES

33 DEG 16 MIN N, 119 DEG 30 MIN W - CENTRAL PART NE COAST

MARCH 1940

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0254 | 1.1 | 0852 | 5.0 | 1539 | -0.3 | 2146 | 4.0 |
| 2 | 0330 | 1.0 | 0922 | 4.8 | 1604 | -0.1 | 2207 | 4.1 |
| 3 | 0402 | 0.9 | 0952 | 4.6 | 1624 | 0.2 | 2234 | 4.1 |
| 4 | 0434 | 0.9 | 1024 | 4.2 | 1651 | 0.5 | 2254 | 4.1 |
| 5 | 0513 | 1.0 | 1054 | 3.7 | 1715 | 0.9 | 2324 | 4.0 |
| 6 | 0554 | 1.1 | 1142 | 3.3 | 1737 | 1.3 | 0000 | 3.9* |
| 7 | 0653 | 1.2 | 1234 | 2.4 | 1804 | 1.6 | --- | --- |
| 8 | 0034 | 3.9 | 0413 | 1.3 | 1416 | 2.5 | 1844 | 2.0 |
| 9 | 0142 | 3.8 | 0953 | 1.0 | 1653 | 2.5 | 2010 | 2.4 |
| 10 | 0310 | 3.9 | 1116 | 0.6 | 1807 | 2.8 | 2216 | 2.4 |
| 11 | 0429 | 4.2 | 1210 | 0.1 | 1844 | 3.2 | 2335 | 2.1 |
| 12 | 0534 | 4.6 | 1254 | -0.4 | 1916 | 3.5 | --- | --- |
| 13 | 0631 | 1.6 | 0627 | 5.0 | 1331 | -0.7 | 1944 | 3.9 |
| 14 | 0114 | 1.1 | 0713 | 5.4 | 1410 | -0.9 | 2019 | 4.4 |
| 15 | 0204 | 0.5 | 0801 | 5.6 | 1447 | -1.0 | 2051 | 4.6 |
| 16 | 0250 | 0.2 | 0846 | 5.4 | 1525 | -0.4 | 2127 | 4.9 |
| 17 | 0334 | -0.2 | 0935 | 5.3 | 1601 | -0.5 | 2204 | 5.1 |
| 18 | 0428 | -0.3 | 1024 | 4.8 | 1639 | 0.0 | 2244 | 5.1 |
| 19 | 0520 | -0.3 | 1114 | 4.2 | 1714 | 0.5 | 2327 | 5.0 |
| 20 | 0619 | -0.1 | 1222 | 3.5 | 1802 | 1.2 | --- | --- |
| 21 | 0015 | 4.7 | 0728 | 0.2 | 1342 | 3.1 | 1854 | 1.7 |
| 22 | 0115 | 4.5 | 0857 | 0.3 | 1537 | 2.9 | 2014 | 2.2 |
| 23 | 0234 | 4.2 | 1027 | 0.3 | 1722 | 3.1 | 2204 | 2.3 |
| 24 | 0400 | 4.1 | 1134 | 0.1 | 1822 | 3.4 | 2332 | 2.1 |
| 25 | 0514 | 4.2 | 1231 | -0.1 | 1904 | 3.6 | --- | --- |
| 26 | 0630 | 1.7 | 0612 | 4.4 | 1313 | -0.2 | 1939 | 3.8 |
| 27 | 0113 | 1.5 | 0657 | 4.5 | 1346 | -0.2 | 1954 | 4.0 |
| 28 | 0145 | 1.1 | 0732 | 4.5 | 1412 | -0.1 | 2020 | 4.1 |
| 29 | 0216 | 0.4 | 0806 | 4.5 | 1440 | 0.0 | 2041 | 4.3 |
| 30 | 0247 | 0.6 | 0837 | 4.5 | 1502 | 0.2 | 2102 | 4.4 |
| 31 | 0316 | 0.5 | 0909 | 4.3 | 1524 | 0.4 | 2124 | 4.5 |

* -- TIDE OCCURS ON NEXT DATE.

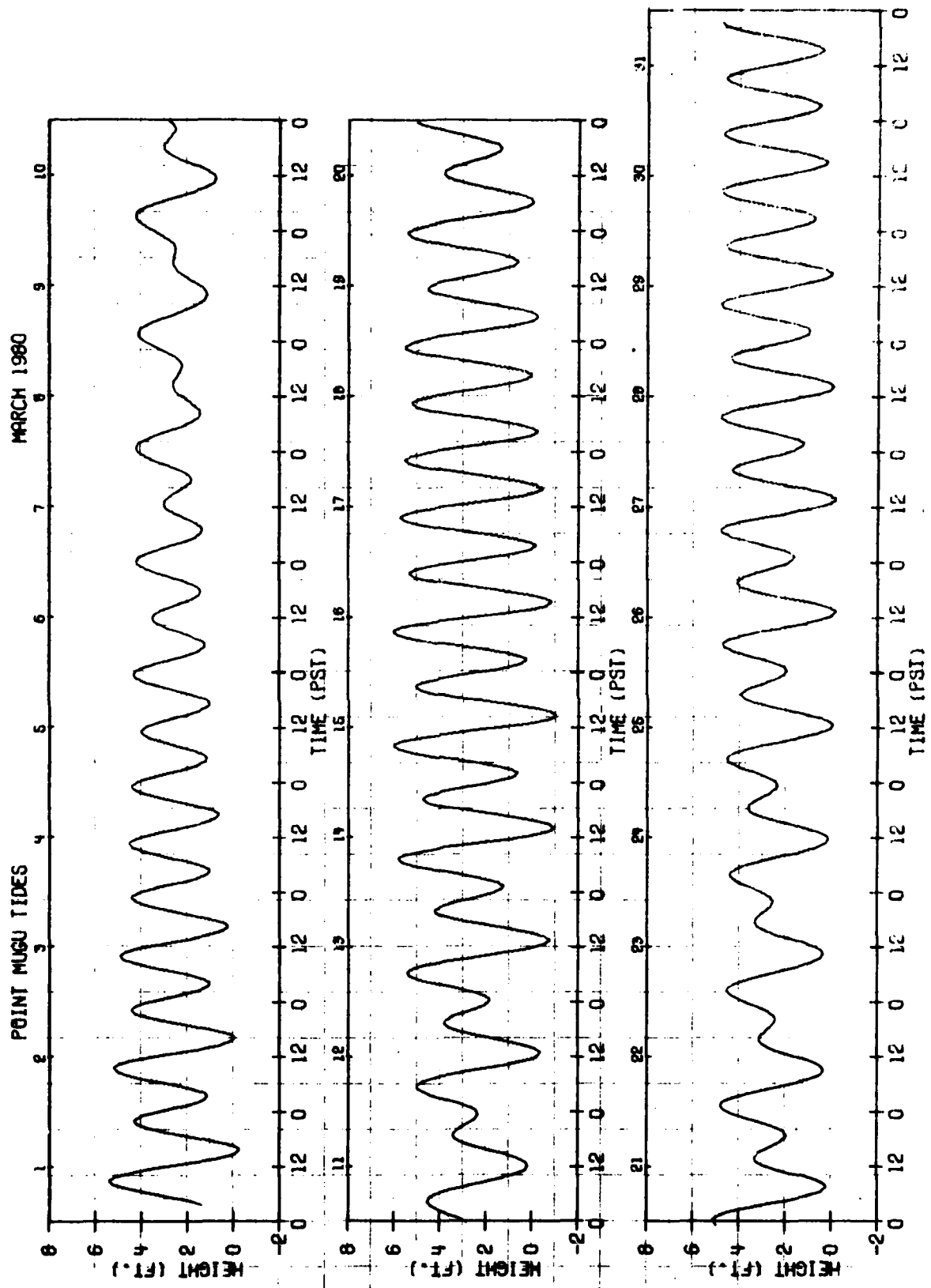


Figure 3. Tidal Graph for Point Mugu, March 1980.

TABLE 10
POINT MUGU TIDES
34 DEG 06 MIN N. 119 DEG 06 MIN W - OCFAN PIER

APRIL 1980

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0337 | 0.4 | 0935 | 4.4 | 1536 | 0.7 | 2138 | 4.8 |
| 2 | 0409 | 0.3 | 1010 | 4.0 | 1600 | 1.0 | 2203 | 4.8 |
| 3 | 0447 | 0.3 | 1048 | 3.7 | 1622 | 1.4 | 2229 | 4.7 |
| 4 | 0526 | 0.4 | 1133 | 3.3 | 1647 | 1.8 | 2301 | 4.6 |
| 5 | 0622 | 0.6 | 1238 | 2.9 | 1716 | 2.1 | 2340 | 4.4 |
| 6 | 0728 | 0.7 | 1420 | 2.7 | 1801 | 2.5 | --- | --- |
| 7 | 0839 | 4.2 | 0854 | 0.6 | 1826 | 2.9 | 1944 | 2.7 |
| 8 | 0207 | 4.1 | 1014 | 0.4 | 1726 | 3.3 | 2155 | 2.5 |
| 9 | 0343 | 4.3 | 1114 | 0.0 | 1758 | 3.7 | 2315 | 2.1 |
| 10 | 0459 | 4.6 | 1202 | -0.3 | 1830 | 4.2 | --- | --- |
| 11 | 0612 | 1.4 | 0601 | 4.9 | 1844 | -0.5 | 1904 | 4.7 |
| 12 | 0100 | 0.7 | 0653 | 5.2 | 1324 | -0.6 | 1937 | 5.2 |
| 13 | 0146 | 0.0 | 0743 | 5.3 | 1404 | -0.5 | 2009 | 5.6 |
| 14 | 0233 | -0.5 | 0834 | 5.2 | 1440 | -0.2 | 2046 | 5.9 |
| 15 | 0319 | -0.9 | 0923 | 5.0 | 1518 | 0.2 | 2123 | 6.0 |
| 16 | 0406 | -1.0 | 1015 | 4.6 | 1557 | 0.7 | 2201 | 5.9 |
| 17 | 0458 | -0.9 | 1111 | 4.1 | 1639 | 1.3 | 2244 | 5.6 |
| 18 | 0556 | -0.7 | 1215 | 3.6 | 1721 | 1.8 | 0024 | 5.2* |
| 19 | 0659 | -0.3 | 1338 | 3.3 | 1820 | 2.3 | --- | --- |
| 20 | 0826 | 4.7 | 0811 | 0.0 | 1521 | 3.3 | 1948 | 2.6 |
| 21 | 0139 | 4.3 | 0931 | 0.2 | 1644 | 3.5 | 2145 | 2.5 |
| 22 | 0311 | 4.0 | 1041 | 0.2 | 1739 | 3.8 | 2309 | 2.3 |
| 23 | 0433 | 3.9 | 1133 | 0.2 | 1816 | 4.1 | 0005 | 1.8* |
| 24 | 0534 | 4.0 | 1215 | 0.3 | 1845 | 4.3 | --- | --- |
| 25 | 0647 | 1.4 | 0625 | 4.1 | 1251 | 0.3 | 1908 | 4.5 |
| 26 | 0120 | 1.0 | 0706 | 4.2 | 1319 | 0.5 | 1930 | 4.7 |
| 27 | 0152 | 0.6 | 0743 | 4.2 | 1345 | 0.6 | 1952 | 4.9 |
| 28 | 0221 | 0.3 | 0817 | 4.1 | 1409 | 0.8 | 2014 | 5.1 |
| 29 | 0253 | 0.0 | 0852 | 4.0 | 1434 | 1.0 | 2037 | 5.2 |
| 30 | 0325 | -0.2 | 0927 | 3.9 | 1456 | 1.3 | 2100 | 5.3 |

* -- TIME OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 11
SAN NICOLAS ISLAND TIDES
33 DEG 16 MIN N. 119 DEG 30 MIN W - CENTRAL PART NE COAST

APRIL 1980

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0347 | 0.4 | 0942 | 4.1 | 1546 | 0.6 | 2145 | 4.5 |
| 2 | 0414 | 0.3 | 1017 | 3.7 | 1610 | 0.9 | 2210 | 4.5 |
| 3 | 0457 | 0.3 | 1055 | 3.5 | 1632 | 1.3 | 2236 | 4.4 |
| 4 | 0536 | 0.4 | 1140 | 3.1 | 1657 | 1.6 | 2308 | 4.3 |
| 5 | 0632 | 0.5 | 1245 | 2.7 | 1726 | 1.9 | 2347 | 4.1 |
| 6 | 0734 | 0.6 | 1427 | 2.5 | 1811 | 2.3 | --- | --- |
| 7 | 0846 | 3.9 | 0904 | 0.5 | 1833 | 2.7 | 1954 | 2.5 |
| 8 | 0214 | 3.8 | 1024 | 0.4 | 1733 | 3.1 | 2205 | 2.4 |
| 9 | 0350 | 4.0 | 1124 | 0.0 | 1805 | 3.5 | 2325 | 1.9 |
| 10 | 0506 | 4.3 | 1212 | -0.3 | 1837 | 3.9 | --- | --- |
| 11 | 0622 | 1.3 | 0604 | 4.6 | 1254 | -0.5 | 1911 | 4.4 |
| 12 | 0110 | 0.6 | 0700 | 4.8 | 1334 | -0.5 | 1944 | 4.8 |
| 13 | 0156 | 0.0 | 0750 | 4.9 | 1414 | -0.5 | 2016 | 5.2 |
| 14 | 0243 | -0.5 | 0841 | 4.8 | 1450 | -0.2 | 2053 | 5.5 |
| 15 | 0329 | -0.8 | 0930 | 4.6 | 1528 | 0.2 | 2130 | 5.6 |
| 16 | 0416 | -0.9 | 1022 | 4.3 | 1607 | 0.6 | 2208 | 5.5 |
| 17 | 0504 | -0.8 | 1118 | 3.8 | 1649 | 1.2 | 2251 | 5.2 |
| 18 | 0606 | -0.6 | 1222 | 3.4 | 1731 | 1.6 | 0031 | 4.8* |
| 19 | 0709 | -0.3 | 1345 | 3.1 | 1830 | 2.1 | --- | --- |
| 20 | 0833 | 4.4 | 0821 | 0.0 | 1528 | 3.1 | 1958 | 2.5 |
| 21 | 0146 | 4.0 | 0941 | 0.2 | 1651 | 3.3 | 2155 | 2.4 |
| 22 | 0318 | 3.7 | 1051 | 0.2 | 1746 | 3.5 | 2319 | 2.1 |
| 23 | 0440 | 3.6 | 1143 | 0.2 | 1823 | 3.8 | 0015 | 1.6* |
| 24 | 0541 | 3.7 | 1225 | 0.3 | 1852 | 4.0 | --- | --- |
| 25 | 0657 | 1.3 | 0632 | 3.8 | 1301 | 0.3 | 1915 | 4.2 |
| 26 | 0130 | 0.9 | 0713 | 3.9 | 1329 | 0.5 | 1937 | 4.4 |
| 27 | 0202 | 0.5 | 0750 | 3.9 | 1355 | 0.5 | 1959 | 4.6 |
| 28 | 0231 | 0.3 | 0824 | 3.8 | 1419 | 0.7 | 2021 | 4.7 |
| 29 | 0303 | 0.0 | 0859 | 3.7 | 1444 | 0.9 | 2044 | 4.8 |
| 30 | 0335 | -0.2 | 0934 | 3.6 | 1506 | 1.2 | 2107 | 4.9 |

* -- TIME OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

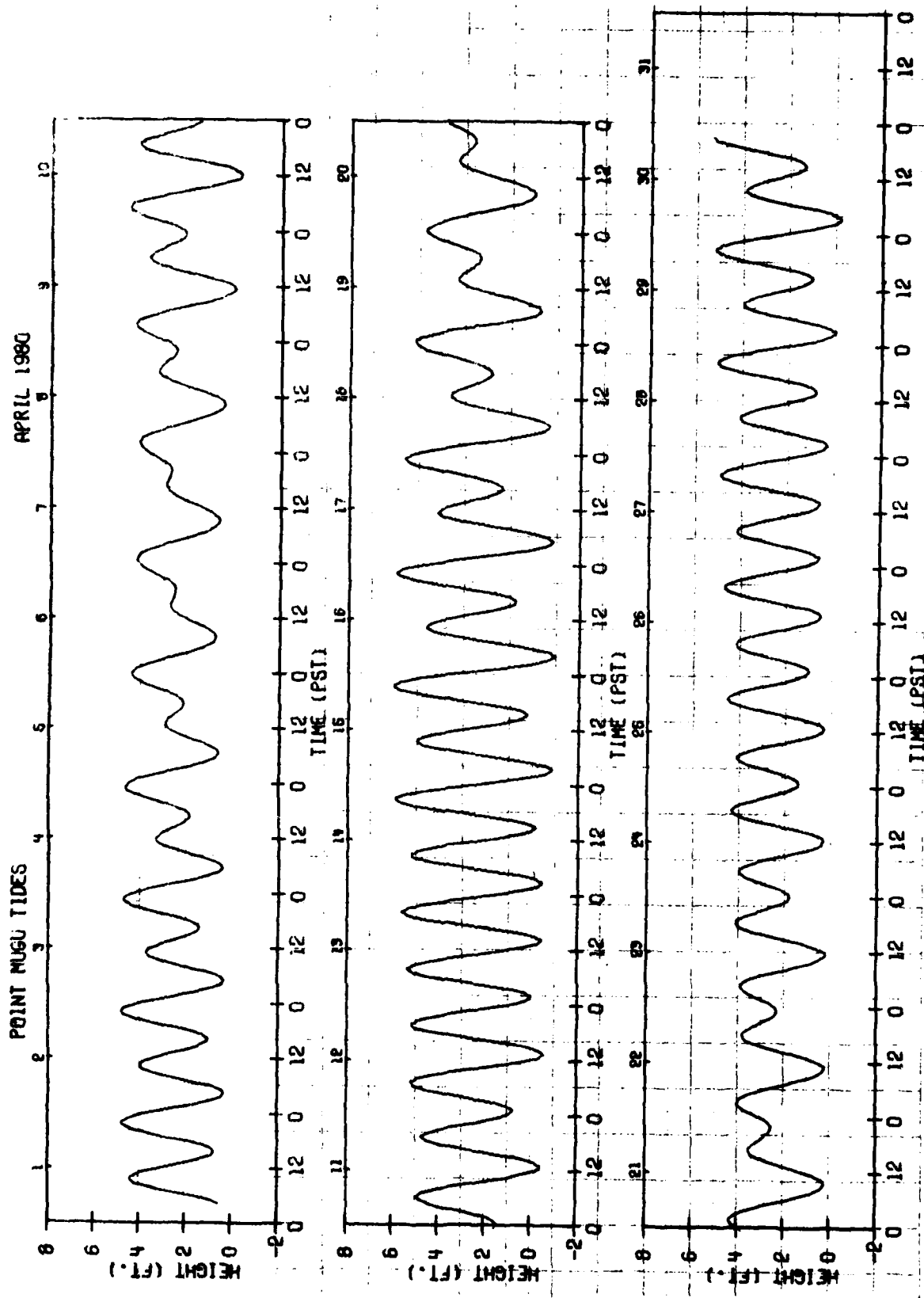


Figure 4. Tidal Graph for Point Mugu, April 1980.

TABLE 12
POINT MUGU TIDES
34 DEG 06 MIN N 119 DEG 06 MIN W - OCEAN PIER MAY 1980

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0357 | -0.3 | 1009 | 3.7 | 1521 | 1.5 | 2124 | 5.2 |
| 2 | 0436 | -0.3 | 1050 | 3.5 | 1550 | 1.8 | 2154 | 5.2 |
| 3 | 0518 | -0.2 | 1141 | 3.2 | 1622 | 2.2 | 2232 | 5.0 |
| 4 | 0606 | -0.1 | 1249 | 3.1 | 1700 | 2.5 | 2316 | 4.7 |
| 5 | 0706 | 0.1 | 1415 | 3.1 | 1806 | 2.6 | --- | --- |
| 6 | 0815 | 4.5 | 0816 | 0.1 | 1538 | 3.3 | 1956 | 2.7 |
| 7 | 0937 | 4.2 | 0926 | 0.1 | 1636 | 3.7 | 2148 | 2.5 |
| 8 | 0311 | 4.1 | 1027 | 0.0 | 1715 | 4.2 | 2304 | 1.9 |
| 9 | 0436 | 4.2 | 1120 | 0.0 | 1752 | 4.7 | 0002 | 1.1* |
| 10 | 0542 | 4.3 | 1205 | 0.0 | 1826 | 5.2 | --- | --- |
| 11 | 0652 | 0.3 | 0643 | 4.5 | 1247 | 0.1 | 1901 | 5.7 |
| 12 | 0140 | -0.4 | 0737 | 4.5 | 1329 | 0.4 | 1938 | 6.1 |
| 13 | 0226 | -1.0 | 0830 | 4.5 | 1407 | 0.6 | 2016 | 6.3 |
| 14 | 0312 | -1.3 | 0921 | 4.3 | 1447 | 1.0 | 2055 | 6.4 |
| 15 | 0357 | -1.4 | 1014 | 4.1 | 1528 | 1.4 | 2134 | 6.2 |
| 16 | 0446 | -0.9 | 1111 | 3.9 | 1610 | 1.8 | 2216 | 5.8 |
| 17 | 0537 | -0.9 | 1214 | 3.6 | 1700 | 2.2 | 2259 | 5.3 |
| 18 | 0633 | -0.6 | 1323 | 3.5 | 1758 | 2.5 | 2350 | 4.8 |
| 19 | 0731 | -0.2 | 1439 | 3.5 | 1821 | 2.7 | --- | --- |
| 20 | 0834 | 0.2 | 1554 | 3.7 | 1854 | 3.7 | 2106 | 2.6 |
| 21 | 0939 | 0.4 | 1647 | 4.0 | 1947 | 4.0 | 2238 | 2.4 |
| 22 | 1037 | 3.6 | 1725 | 4.2 | 2028 | 4.2 | 2338 | 1.9 |
| 23 | 0451 | 3.5 | 1117 | 0.8 | 1757 | 4.5 | --- | --- |
| 24 | 0526 | 1.4 | 1154 | 0.9 | 1822 | 4.8 | 1822 | 4.8 |
| 25 | 0602 | 0.9 | 1228 | 1.1 | 1846 | 5.0 | 1912 | 5.3 |
| 26 | 0634 | 0.5 | 1258 | 1.3 | 1912 | 5.3 | 1938 | 5.5 |
| 27 | 0706 | 0.1 | 1327 | 1.4 | 1938 | 5.5 | 2004 | 5.6 |
| 28 | 0738 | -0.2 | 1355 | 1.6 | 2004 | 5.6 | 2033 | 5.7 |
| 29 | 0813 | -0.5 | 1427 | 1.8 | 2033 | 5.7 | 2104 | 5.7 |
| 30 | 0848 | -0.6 | 1459 | 1.9 | 2104 | 5.7 | 2140 | 5.6 |
| 31 | 0927 | -0.7 | 1531 | 2.2 | 2140 | 5.6 | --- | --- |

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 13
SAN NICOLAS ISLAND TIDES
33 DEG 16 MIN N 119 DEG 30 MIN W - CENTRAL PART NE COAST MAY 1980

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0407 | -0.3 | 1016 | 3.5 | 1531 | 1.4 | 2135 | 4.8 |
| 2 | 0446 | -0.3 | 1057 | 3.3 | 1600 | 1.6 | 2205 | 4.8 |
| 3 | 0524 | -0.2 | 1148 | 3.0 | 1632 | 2.0 | 2239 | 4.6 |
| 4 | 0616 | -0.1 | 1256 | 2.9 | 1710 | 2.3 | 2323 | 4.4 |
| 5 | 0716 | 0.1 | 1422 | 2.9 | 1814 | 2.5 | --- | --- |
| 6 | 0822 | 4.2 | 0826 | 0.1 | 1545 | 3.1 | 2006 | 2.5 |
| 7 | 0144 | 3.4 | 0936 | 0.1 | 1643 | 3.5 | 2158 | 2.3 |
| 8 | 0316 | 3.8 | 1037 | 0.0 | 1722 | 3.9 | 2314 | 1.7 |
| 9 | 0443 | 3.9 | 1130 | 0.0 | 1759 | 4.4 | 0012 | 1.0* |
| 10 | 0544 | 4.0 | 1215 | 0.0 | 1833 | 4.4 | --- | --- |
| 11 | 0627 | 0.3 | 0650 | 4.2 | 1257 | 0.1 | 1908 | 5.3 |
| 12 | 0150 | -0.4 | 0744 | 4.2 | 1339 | 0.4 | 1945 | 5.6 |
| 13 | 0236 | -0.9 | 0837 | 4.2 | 1417 | 0.5 | 2023 | 5.4 |
| 14 | 0322 | -1.2 | 0928 | 4.0 | 1457 | 0.9 | 2102 | 5.9 |
| 15 | 0407 | -1.3 | 1021 | 3.8 | 1538 | 1.3 | 2141 | 5.7 |
| 16 | 0456 | -1.1 | 1118 | 3.6 | 1620 | 1.6 | 2223 | 5.4 |
| 17 | 0547 | -0.8 | 1221 | 3.4 | 1710 | 2.0 | 2306 | 4.9 |
| 18 | 0643 | -0.5 | 1330 | 3.3 | 1808 | 2.4 | 2357 | 4.5 |
| 19 | 0741 | -0.2 | 1446 | 3.3 | 1931 | 2.5 | --- | --- |
| 20 | 0859 | 3.9 | 0844 | 0.2 | 1601 | 3.5 | 2116 | 2.5 |
| 21 | 0218 | 3.5 | 0949 | 0.4 | 1654 | 3.7 | 2248 | 2.2 |
| 22 | 0344 | 3.4 | 1042 | 0.5 | 1732 | 3.9 | 2348 | 1.7 |
| 23 | 0438 | 3.3 | 1127 | 0.7 | 1804 | 4.2 | --- | --- |
| 24 | 0536 | 1.3 | 0559 | 3.3 | 1204 | 0.8 | 1829 | 4.5 |
| 25 | 0612 | 0.8 | 0650 | 3.4 | 1238 | 1.0 | 1853 | 4.6 |
| 26 | 0644 | 0.5 | 0732 | 3.4 | 1308 | 1.2 | 1914 | 4.9 |
| 27 | 0716 | 0.1 | 0813 | 3.5 | 1337 | 1.3 | 1945 | 5.1 |
| 28 | 0748 | -0.2 | 0852 | 3.5 | 1405 | 1.5 | 2011 | 5.2 |
| 29 | 0823 | -0.5 | 0932 | 3.4 | 1437 | 1.6 | 2040 | 5.3 |
| 30 | 0858 | -0.5 | 1014 | 3.4 | 1509 | 1.7 | 2111 | 5.3 |
| 31 | 0937 | -0.6 | 1100 | 3.3 | 1541 | 2.0 | 2147 | 5.2 |

* -- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 14
POINT MUGU TIDES
34 DEG 06 MIN N, 119 DEG 06 MIN W - OCEAN PIER

JUNE 1980

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0509 | -0.6 | 1145 | 3.5 | 1614 | 2.4 | 2219 | 5.4 |
| 2 | 0555 | -0.5 | 1244 | 3.5 | 1705 | 2.5 | 2304 | 5.1 |
| 3 | 0646 | -0.4 | 1346 | 3.6 | 1818 | 2.6 | --- | --- |
| 4 | 0003 | 4.7 | 0742 | -0.1 | 1448 | 3.9 | 1953 | 2.6 |
| 5 | 0119 | 4.3 | 0842 | 0.1 | 1543 | 4.2 | 2131 | 2.3 |
| 6 | 0248 | 3.9 | 0942 | 0.3 | 1633 | 4.7 | 2251 | 1.6 |
| 7 | 0417 | 3.4 | 1035 | 0.5 | 1715 | 5.2 | 2354 | 0.8 |
| 8 | 0534 | 3.8 | 1126 | 0.7 | 1755 | 5.7 | --- | --- |
| 9 | 0648 | 0.1 | 1214 | 1.0 | 1834 | 6.1 | 1834 | 6.1 |
| 10 | 0135 | -0.6 | 0739 | 4.0 | 1300 | 1.2 | 1914 | 6.4 |
| 11 | 0221 | -1.0 | 0832 | 4.6 | 1343 | 1.4 | 1952 | 6.5 |
| 12 | 0306 | -1.3 | 0923 | 4.0 | 1425 | 1.6 | 2034 | 6.5 |
| 13 | 0351 | -1.3 | 1011 | 4.0 | 1509 | 1.9 | 2113 | 6.3 |
| 14 | 0433 | -1.2 | 1103 | 3.4 | 1551 | 2.1 | 2153 | 6.0 |
| 15 | 0514 | -0.9 | 1154 | 3.8 | 1637 | 2.4 | 2235 | 5.5 |
| 16 | 0604 | -0.5 | 1247 | 3.8 | 1732 | 2.5 | 2317 | 5.0 |
| 17 | 0649 | -0.1 | 1349 | 3.8 | 1840 | 2.7 | --- | --- |
| 18 | 0010 | 4.4 | 0736 | 0.3 | 1445 | 3.9 | 2005 | 2.7 |
| 19 | 0104 | 3.9 | 0829 | 0.7 | 1537 | 4.1 | 2139 | 2.5 |
| 20 | 0231 | 3.4 | 0918 | 1.0 | 1623 | 4.3 | 2259 | 2.1 |
| 21 | 0401 | 3.2 | 1008 | 1.3 | 1659 | 4.6 | 2351 | 1.6 |
| 22 | 0518 | 3.1 | 1056 | 1.6 | 1731 | 4.9 | --- | --- |
| 23 | 0036 | 1.0 | 0621 | 3.2 | 1134 | 1.7 | 1803 | 5.2 |
| 24 | 0114 | 0.5 | 0713 | 3.3 | 1213 | 1.8 | 1835 | 5.5 |
| 25 | 0150 | 0.1 | 0755 | 3.5 | 1251 | 1.9 | 1906 | 5.7 |
| 26 | 0222 | -0.3 | 0838 | 3.6 | 1327 | 2.0 | 1937 | 6.0 |
| 27 | 0257 | -0.6 | 0917 | 3.7 | 1402 | 2.0 | 2014 | 6.1 |
| 28 | 0335 | -0.8 | 0957 | 3.8 | 1444 | 2.1 | 2050 | 6.2 |
| 29 | 0413 | -0.9 | 1037 | 3.9 | 1526 | 2.2 | 2129 | 6.1 |
| 30 | 0452 | -0.9 | 1122 | 3.9 | 1612 | 2.3 | 2213 | 5.9 |

ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 15
SAN NICOLAS ISLAND TIDES
33 DEG 16 MIN N, 119 DEG 30 MIN W - CENTRAL PART NE COAST

JUNE 1980

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0519 | -0.5 | 1152 | 3.3 | 1624 | 2.2 | 2226 | 5.0 |
| 2 | 0605 | -0.5 | 1251 | 3.3 | 1715 | 2.4 | 2311 | 4.7 |
| 3 | 0656 | -0.4 | 1353 | 3.4 | 1828 | 2.5 | --- | --- |
| 4 | 0010 | 4.4 | 0752 | -0.1 | 1455 | 3.6 | 2003 | 2.5 |
| 5 | 0126 | 4.0 | 0852 | 0.1 | 1550 | 3.9 | 2141 | 2.1 |
| 6 | 0255 | 3.6 | 0952 | 0.3 | 1640 | 4.4 | 2301 | 1.5 |
| 7 | 0424 | 3.5 | 1045 | 0.5 | 1722 | 4.4 | 0004 | 0.7* |
| 8 | 0541 | 3.5 | 1136 | 0.6 | 1802 | 5.3 | --- | --- |
| 9 | 0058 | 0.1 | 0647 | 3.6 | 1224 | 0.9 | 1841 | 5.6 |
| 10 | 0145 | -0.5 | 0746 | 3.7 | 1310 | 1.1 | 1921 | 5.9 |
| 11 | 0231 | -0.9 | 0839 | 3.7 | 1353 | 1.3 | 1959 | 6.0 |
| 12 | 0316 | -1.2 | 0930 | 3.7 | 1435 | 1.5 | 2041 | 6.0 |
| 13 | 0401 | -1.2 | 1018 | 3.7 | 1519 | 1.7 | 2120 | 5.8 |
| 14 | 0443 | -1.1 | 1110 | 3.6 | 1601 | 1.9 | 2200 | 5.6 |
| 15 | 0528 | -0.8 | 1201 | 3.5 | 1647 | 2.2 | 2242 | 5.1 |
| 16 | 0614 | -0.5 | 1254 | 3.5 | 1742 | 2.4 | 2324 | 4.6 |
| 17 | 0659 | -0.1 | 1356 | 3.5 | 1850 | 2.5 | --- | --- |
| 18 | 0017 | 4.1 | 0746 | 0.3 | 1452 | 3.6 | 2015 | 2.5 |
| 19 | 0116 | 3.6 | 0839 | 0.6 | 1544 | 3.8 | 2149 | 2.3 |
| 20 | 0238 | 3.2 | 0928 | 0.9 | 1630 | 4.0 | 2309 | 1.9 |
| 21 | 0408 | 3.0 | 1018 | 1.2 | 1706 | 4.3 | 0001 | 1.5* |
| 22 | 0525 | 2.9 | 1106 | 1.5 | 1738 | 4.6 | --- | --- |
| 23 | 0046 | 0.9 | 0628 | 3.0 | 1144 | 1.5 | 1810 | 4.4 |
| 24 | 0124 | 0.5 | 0720 | 3.1 | 1223 | 1.6 | 1842 | 5.1 |
| 25 | 0200 | 0.1 | 0802 | 3.3 | 1301 | 1.7 | 1913 | 5.3 |
| 26 | 0232 | -0.3 | 0845 | 3.4 | 1337 | 1.8 | 1944 | 5.6 |
| 27 | 0307 | -0.5 | 0924 | 3.5 | 1412 | 1.8 | 2021 | 5.6 |
| 28 | 0345 | -0.7 | 1004 | 3.5 | 1454 | 1.9 | 2057 | 5.7 |
| 29 | 0423 | -0.8 | 1044 | 3.6 | 1536 | 2.0 | 2136 | 5.6 |
| 30 | 0502 | -0.8 | 1129 | 3.6 | 1622 | 2.1 | 2220 | 5.5 |

* -- TIME OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

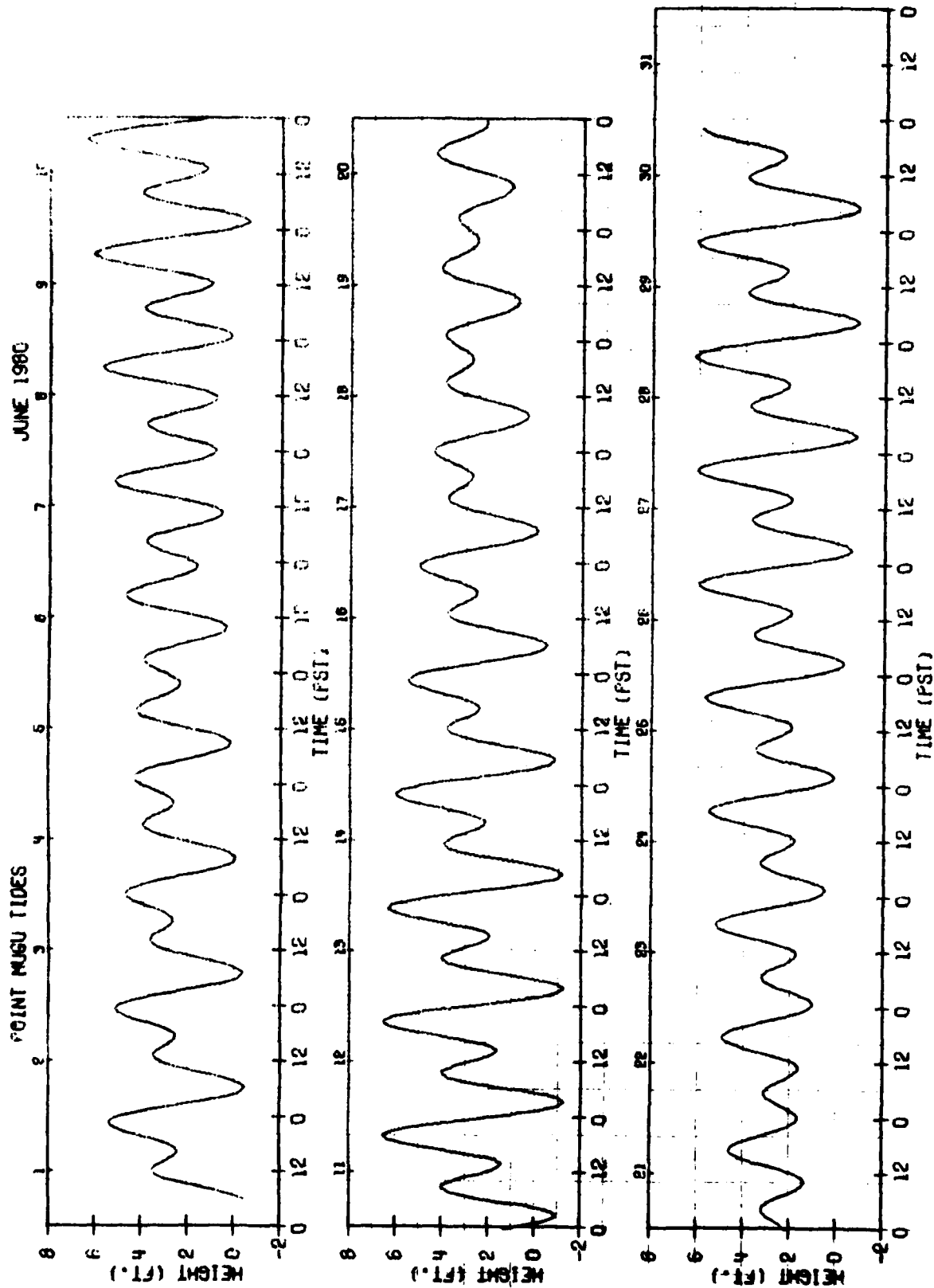


Figure 6. Tidal Graph for Point Mugu, June 1980.

TABLE 16
POINT MUGU TIDES
34 DEG 06 MIN N, 119 DEG 06 MIN W - OCEAN PIER
JULY 1980

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0535 | -0.7 | 1210 | 4.0 | 1708 | 2.3 | 2302 | 5.5 |
| 2 | 0621 | -0.4 | 1303 | 4.2 | 1817 | 2.4 | 2357 | 4.9 |
| 3 | 0707 | 0.0 | 1358 | 4.4 | 1941 | 2.3 | --- | --- |
| 4 | 0107 | 4.3 | 0803 | 0.4 | 1855 | 4.7 | 2114 | 1.9 |
| 5 | 0234 | 3.8 | 0859 | 0.8 | 1548 | 5.1 | 2240 | 1.3 |
| 6 | 0409 | 3.5 | 0958 | 1.2 | 1638 | 5.5 | 2346 | 0.6 |
| 7 | 0536 | 3.5 | 1057 | 1.5 | 1728 | 5.9 | --- | --- |
| 8 | 0644 | 0.0 | 0649 | 3.6 | 1152 | 1.7 | 1813 | 6.2 |
| 9 | 0133 | -0.5 | 0743 | 3.8 | 1244 | 1.8 | 1858 | 6.4 |
| 10 | 0215 | -0.9 | 0834 | 3.9 | 1330 | 1.9 | 1938 | 6.5 |
| 11 | 0257 | -1.0 | 0918 | 4.0 | 1412 | 2.0 | 2020 | 6.5 |
| 12 | 0336 | -1.0 | 1000 | 4.1 | 1455 | 2.0 | 2059 | 6.3 |
| 13 | 0415 | -0.9 | 1037 | 4.1 | 1534 | 2.1 | 2135 | 6.0 |
| 14 | 0451 | -0.6 | 1119 | 4.1 | 1620 | 2.2 | 2213 | 5.6 |
| 15 | 0526 | -0.3 | 1158 | 4.1 | 1703 | 2.4 | 2252 | 5.1 |
| 16 | 0603 | 0.2 | 1240 | 4.1 | 1758 | 2.5 | 2330 | 4.6 |
| 17 | 0640 | 0.6 | 1324 | 4.1 | 1802 | 2.5 | --- | --- |
| 18 | 0019 | 4.0 | 0719 | 1.1 | 1414 | 4.2 | 2026 | 2.5 |
| 19 | 0129 | 3.4 | 0802 | 1.5 | 1506 | 4.3 | 2203 | 2.2 |
| 20 | 0301 | 3.0 | 0853 | 1.9 | 1554 | 4.5 | 2315 | 1.7 |
| 21 | 0449 | 3.0 | 0952 | 2.1 | 1641 | 4.8 | --- | --- |
| 22 | 0611 | 1.2 | 0606 | 3.1 | 1048 | 2.3 | 1726 | 5.2 |
| 23 | 0052 | 0.7 | 0701 | 3.3 | 1141 | 2.3 | 1803 | 5.5 |
| 24 | 0129 | 0.2 | 0743 | 3.5 | 1226 | 2.3 | 1841 | 5.9 |
| 25 | 0202 | -0.3 | 0819 | 3.8 | 1308 | 2.2 | 1920 | 6.2 |
| 26 | 0239 | -0.6 | 0854 | 4.0 | 1350 | 2.0 | 1958 | 6.4 |
| 27 | 0313 | -0.9 | 0932 | 4.2 | 1433 | 1.9 | 2040 | 6.5 |
| 28 | 0349 | -0.9 | 1008 | 4.4 | 1519 | 1.8 | 2122 | 6.4 |
| 29 | 0428 | -0.9 | 1047 | 4.5 | 1607 | 1.7 | 2205 | 6.1 |
| 30 | 0508 | -0.6 | 1129 | 4.7 | 1703 | 1.7 | 2253 | 5.6 |
| 31 | 0550 | -0.1 | 1214 | 4.8 | 1806 | 1.7 | 2353 | 4.9 |

ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 17
SAN NICOLAS ISLAND TIDES
33 DEG 16 MIN N, 119 DEG 30 MIN W - CENTRAL PART NE COAST
JULY 1980

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0545 | -0.6 | 1217 | 3.7 | 1718 | 2.1 | 2309 | 5.1 |
| 2 | 0631 | -0.4 | 1310 | 3.9 | 1827 | 2.2 | 0004 | 4.6* |
| 3 | 0717 | 0.0 | 1405 | 4.1 | 1951 | 2.1 | --- | --- |
| 4 | 0114 | 4.0 | 0813 | 0.4 | 1502 | 4.4 | 2124 | 1.7 |
| 5 | 0241 | 3.5 | 0909 | 0.7 | 1555 | 4.7 | 2250 | 1.2 |
| 6 | 0416 | 3.3 | 1008 | 1.1 | 1645 | 5.1 | 2356 | 0.5 |
| 7 | 0543 | 3.3 | 1107 | 1.4 | 1735 | 5.5 | --- | --- |
| 8 | 0654 | 0.0 | 0656 | 3.4 | 1202 | 1.5 | 1820 | 5.7 |
| 9 | 0143 | -0.5 | 0750 | 3.5 | 1254 | 1.6 | 1905 | 5.4 |
| 10 | 0225 | -0.8 | 0841 | 3.6 | 1340 | 1.7 | 1945 | 6.0 |
| 11 | 0307 | -0.9 | 0925 | 3.7 | 1422 | 1.8 | 2027 | 6.0 |
| 12 | 0346 | -0.9 | 1007 | 3.8 | 1505 | 1.8 | 2106 | 5.8 |
| 13 | 0425 | -0.8 | 1044 | 3.8 | 1544 | 1.9 | 2142 | 5.6 |
| 14 | 0501 | -0.5 | 1126 | 3.8 | 1630 | 2.0 | 2220 | 5.2 |
| 15 | 0536 | -0.3 | 1205 | 3.8 | 1713 | 2.2 | 2259 | 4.7 |
| 16 | 0613 | 0.2 | 1247 | 3.8 | 1808 | 2.3 | 2337 | 4.3 |
| 17 | 0650 | 0.5 | 1331 | 3.8 | 1912 | 2.4 | --- | --- |
| 18 | 0026 | 3.7 | 0729 | 1.0 | 1421 | 3.9 | 2036 | 2.3 |
| 19 | 0136 | 3.2 | 0812 | 1.4 | 1513 | 4.0 | 2213 | 2.0 |
| 20 | 0308 | 2.8 | 0903 | 1.7 | 1601 | 4.2 | 2325 | 1.5 |
| 21 | 0456 | 2.8 | 1002 | 1.9 | 1648 | 4.5 | --- | --- |
| 22 | 0621 | 1.1 | 0613 | 2.9 | 1058 | 2.1 | 1733 | 4.8 |
| 23 | 0102 | 0.6 | 0708 | 3.1 | 1151 | 2.1 | 1810 | 5.1 |
| 24 | 0138 | 0.2 | 0750 | 3.3 | 1236 | 2.1 | 1848 | 5.5 |
| 25 | 0212 | -0.3 | 0826 | 3.5 | 1318 | 2.0 | 1927 | 5.7 |
| 26 | 0244 | -0.5 | 0901 | 3.7 | 1400 | 1.8 | 2005 | 5.4 |
| 27 | 0323 | -0.8 | 0939 | 3.9 | 1443 | 1.7 | 2047 | 6.0 |
| 28 | 0359 | -0.8 | 1015 | 4.1 | 1529 | 1.6 | 2129 | 5.9 |
| 29 | 0438 | -0.8 | 1054 | 4.2 | 1617 | 1.5 | 2212 | 5.6 |
| 30 | 0518 | -0.5 | 1136 | 4.4 | 1713 | 1.5 | 2300 | 5.2 |
| 31 | 0600 | -0.1 | 1221 | 4.5 | 1816 | 1.5 | 0000 | 4.6* |

* --- TIDE OCCURS ON NEXT DATE.
ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

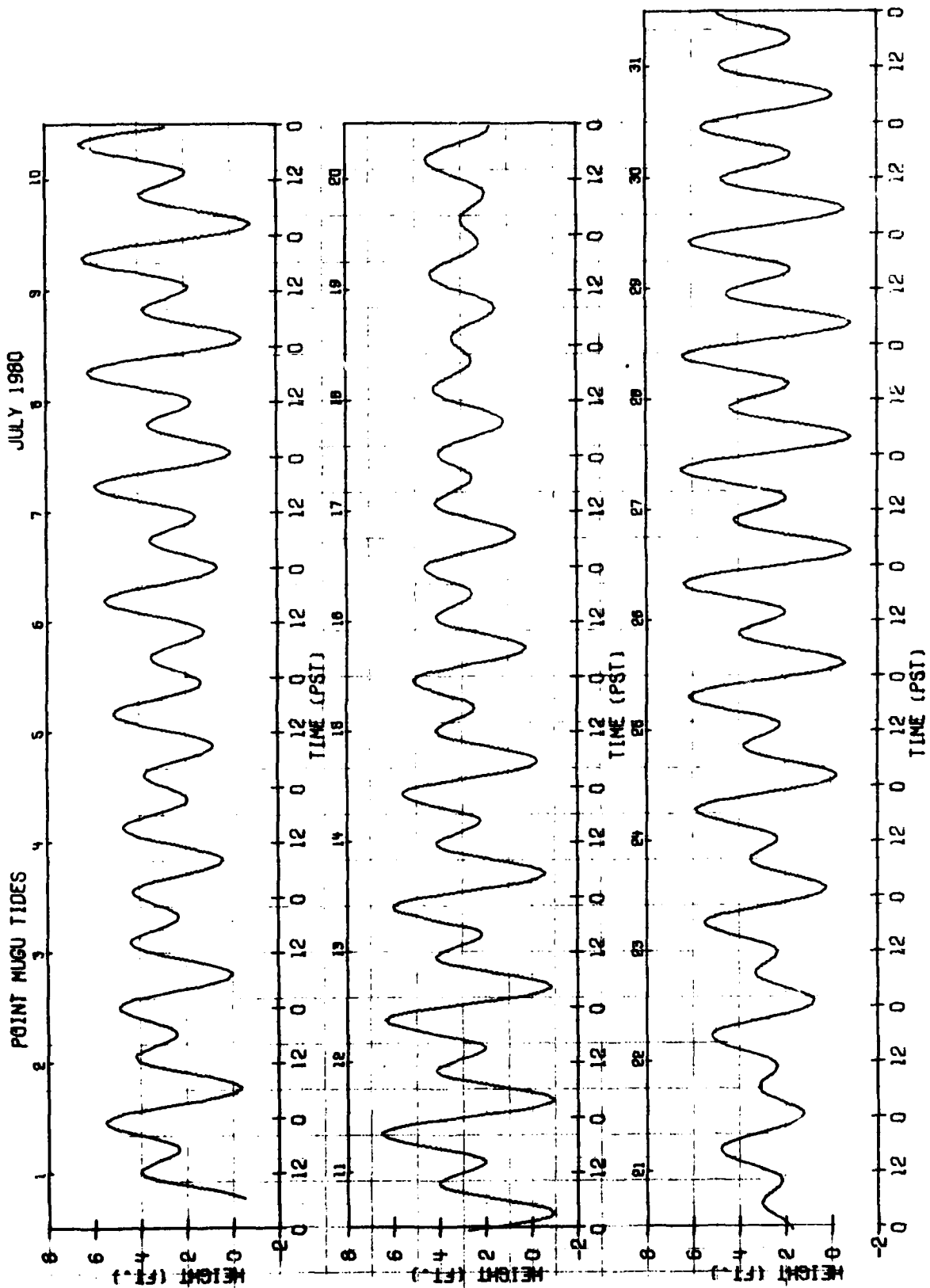


Figure 7. Tidal Graph for Point Mugu, July 1980.

TABLE 18
POINT MUGU TIDES

34 DEG 06 MIN N 119 DEG 06 MIN W - OCEAN PIER

AUGUST 1940

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0633 | 0.4 | 1305 | 5.0 | 1922 | 1.7 | 2052 | 1.5 |
| 2 | 0103 | 4.2 | 0725 | 1.0 | 1405 | 5.1 | 2052 | 1.5 |
| 3 | 0234 | 3.6 | 0823 | 1.6 | 1507 | 5.3 | 2224 | 1.0 |
| 4 | 0419 | 3.4 | 0932 | 2.0 | 1612 | 5.5 | 2337 | 0.5 |
| 5 | 0552 | 3.5 | 1045 | 2.2 | 1710 | 5.8 | --- | --- |
| 6 | 0736 | 0.0 | 0658 | 3.8 | 1803 | 6.2 | --- | --- |
| 7 | 0124 | -0.4 | 0743 | 4.0 | 1242 | 2.1 | 1849 | 6.2 |
| 8 | 0206 | -0.6 | 0829 | 4.2 | 1329 | 2.0 | 1931 | 6.3 |
| 9 | 0242 | -0.6 | 0901 | 4.3 | 1409 | 1.9 | 2004 | 6.2 |
| 10 | 0315 | -0.6 | 0933 | 4.4 | 1445 | 1.9 | 2044 | 6.1 |
| 11 | 0347 | -0.4 | 1001 | 4.4 | 1524 | 1.8 | 2119 | 5.8 |
| 12 | 0415 | -0.1 | 1030 | 4.4 | 1559 | 1.8 | 2154 | 5.5 |
| 13 | 0444 | 0.2 | 1101 | 4.4 | 1638 | 1.9 | 2227 | 5.1 |
| 14 | 0513 | 0.6 | 1133 | 4.4 | 1719 | 2.0 | 2304 | 4.5 |
| 15 | 0542 | 1.1 | 1205 | 4.4 | 1807 | 2.1 | 2348 | 4.0 |
| 16 | 0611 | 1.5 | 1244 | 4.4 | 1917 | 2.2 | --- | --- |
| 17 | 0642 | 3.4 | 0648 | 2.0 | 1333 | 4.4 | 2046 | 2.1 |
| 18 | 0214 | 3.0 | 0730 | 2.4 | 1438 | 4.4 | 2222 | 1.8 |
| 19 | 0434 | 3.0 | 0840 | 2.6 | 1541 | 4.6 | 2335 | 1.3 |
| 20 | 0600 | 3.2 | 1012 | 2.7 | 1644 | 5.0 | --- | --- |
| 21 | 0020 | 0.7 | 0649 | 3.5 | 1122 | 2.5 | 1734 | 5.4 |
| 22 | 0059 | 0.2 | 0721 | 3.8 | 1213 | 2.4 | 1819 | 5.4 |
| 23 | 0133 | -0.2 | 0753 | 4.2 | 1258 | 2.1 | 1901 | 6.2 |
| 24 | 0204 | -0.5 | 0825 | 4.5 | 1344 | 1.7 | 1946 | 6.4 |
| 25 | 0243 | -0.7 | 0854 | 4.8 | 1426 | 1.3 | 2024 | 6.5 |
| 26 | 0321 | -0.7 | 0929 | 5.0 | 1512 | 1.1 | 2111 | 6.4 |
| 27 | 0357 | -0.5 | 1007 | 5.3 | 1600 | 0.9 | 2200 | 6.0 |
| 28 | 0434 | -0.1 | 1046 | 5.4 | 1652 | 0.8 | 2251 | 5.4 |
| 29 | 0514 | 0.4 | 1130 | 5.4 | 1753 | 0.9 | 2350 | 4.7 |
| 30 | 0556 | 1.1 | 1214 | 5.4 | 1846 | 1.0 | --- | --- |
| 31 | 0103 | 4.0 | 0648 | 1.7 | 1318 | 5.3 | 2033 | 1.0 |

ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 19
SAN NICOLAS ISLAND TIDES

33 DEG 16 MIN N 119 DEG 30 MIN W - CENTRAL PART NE COAST

AUGUST 1940

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0643 | 0.4 | 1312 | 4.6 | 1932 | 1.5 | --- | --- |
| 2 | 0116 | 3.9 | 0735 | 0.9 | 1412 | 4.7 | 2102 | 1.4 |
| 3 | 0241 | 3.4 | 0833 | 1.5 | 1514 | 4.9 | 2234 | 0.9 |
| 4 | 0426 | 3.2 | 0942 | 1.8 | 1619 | 5.1 | 2347 | 0.5 |
| 5 | 0554 | 3.3 | 1055 | 2.0 | 1717 | 5.4 | --- | --- |
| 6 | 0706 | 0.0 | 0705 | 3.5 | 1200 | 2.0 | --- | --- |
| 7 | 0134 | -0.4 | 0750 | 3.7 | 1252 | 1.9 | 1810 | 5.6 |
| 8 | 0216 | -0.5 | 0836 | 3.9 | 1339 | 1.8 | 1856 | 5.7 |
| 9 | 0252 | -0.5 | 0908 | 4.0 | 1419 | 1.7 | 1938 | 5.8 |
| 10 | 0325 | -0.5 | 0940 | 4.1 | 1455 | 1.7 | 2015 | 5.7 |
| 11 | 0357 | -0.4 | 1008 | 4.1 | 1534 | 1.6 | 2051 | 5.6 |
| 12 | 0425 | -0.1 | 1037 | 4.1 | 1609 | 1.6 | 2126 | 5.4 |
| 13 | 0454 | 0.2 | 1108 | 4.1 | 1648 | 1.7 | 2201 | 5.1 |
| 14 | 0523 | 0.5 | 1140 | 4.1 | 1729 | 1.8 | 2234 | 4.7 |
| 15 | 0552 | 1.0 | 1212 | 4.1 | 1817 | 1.9 | 2311 | 4.2 |
| 16 | 0621 | 1.4 | 1251 | 4.1 | 1927 | 2.0 | 2355 | 3.7 |
| 17 | 0649 | 3.2 | 0658 | 1.8 | 1340 | 4.1 | --- | --- |
| 18 | 0224 | 2.8 | 0740 | 2.2 | 1445 | 4.3 | 2056 | 1.9 |
| 19 | 0443 | 2.8 | 0850 | 2.5 | 1548 | 4.3 | 2232 | 1.6 |
| 20 | 0607 | 3.0 | 1022 | 2.5 | 1651 | 4.6 | 2345 | 1.2 |
| 21 | 0030 | 0.6 | 0656 | 3.3 | 1132 | 2.4 | --- | --- |
| 22 | 0109 | 0.2 | 0728 | 3.5 | 1223 | 2.2 | 1741 | 5.0 |
| 23 | 0143 | -0.2 | 0800 | 3.9 | 1308 | 1.9 | 1824 | 5.4 |
| 24 | 0214 | -0.5 | 0832 | 4.2 | 1354 | 1.5 | 1904 | 5.7 |
| 25 | 0253 | -0.6 | 0901 | 4.5 | 1436 | 1.2 | 1953 | 5.9 |
| 26 | 0331 | -0.6 | 0936 | 4.6 | 1522 | 1.0 | 2035 | 6.0 |
| 27 | 0407 | -0.5 | 1014 | 4.9 | 1610 | 0.8 | 2118 | 5.9 |
| 28 | 0446 | -0.1 | 1053 | 5.0 | 1702 | 0.7 | 2207 | 5.6 |
| 29 | 0524 | 0.4 | 1137 | 5.0 | 1803 | 0.4 | 2258 | 5.0 |
| 30 | 0606 | 1.0 | 1225 | 5.0 | 1916 | 0.9 | 2357 | 4.4 |
| 31 | 0110 | 3.7 | 0658 | 1.5 | 1325 | 4.9 | --- | --- |

ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

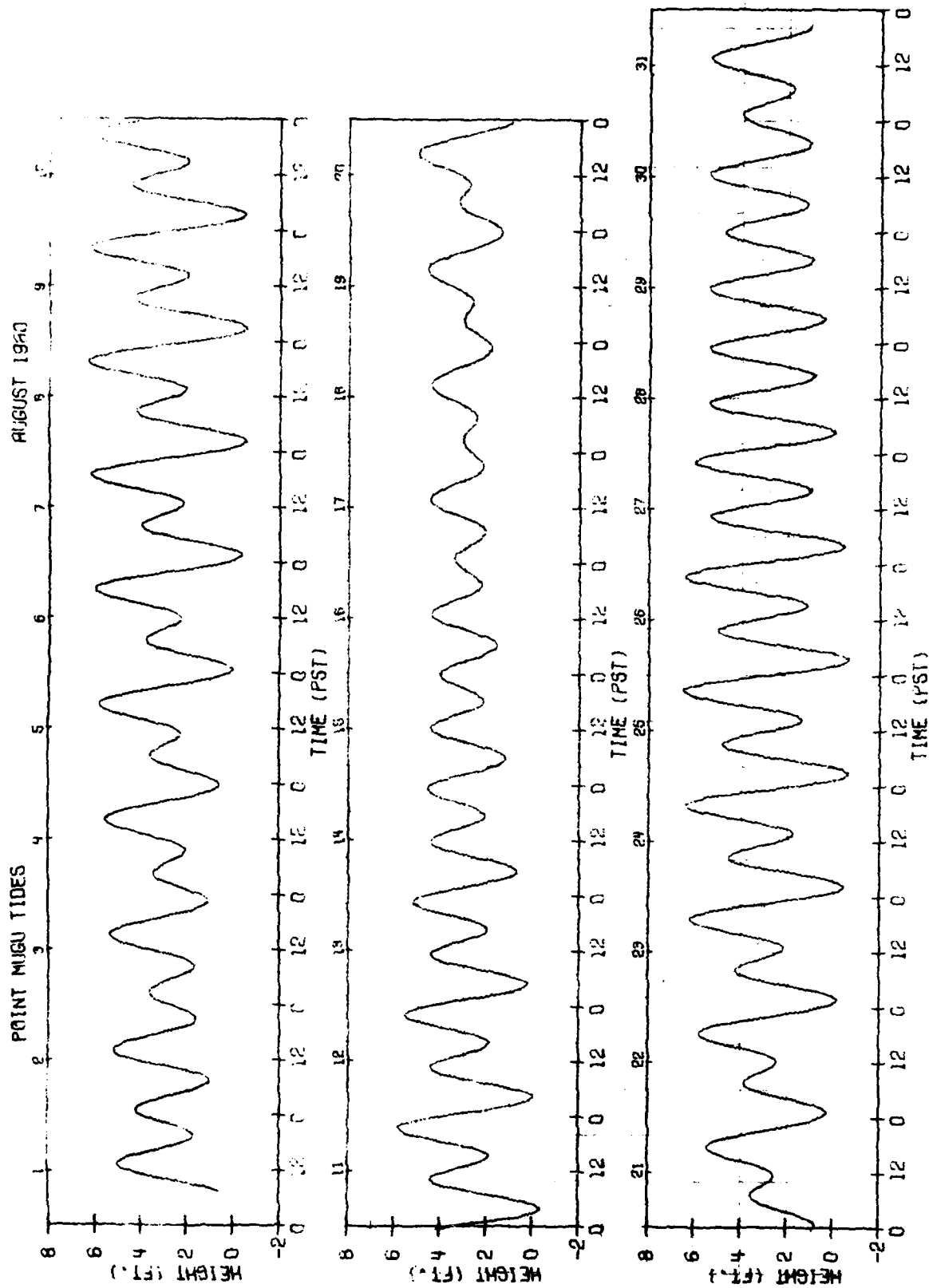


Figure 8. Tidal Graph for Point Mugu, August 1980.

TABLE 20
POINT MUGU TIDES
34 DEG 06 MIN N, 119 DEG 06 MIN W - OCEAN PIER
SEPTEMBER 1940

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0245 | 3.5 | 0757 | 2.3 | 1429 | 5.2 | 2206 | 0.7 |
| 2 | 0438 | 3.5 | 0923 | 2.5 | 1545 | 5.3 | 2322 | 0.4 |
| 3 | 0557 | 3.8 | 1050 | 2.5 | 1659 | 5.4 | --- | --- |
| 4 | 0020 | 0.1 | 0651 | 4.1 | 1158 | 2.4 | 1755 | 5.6 |
| 5 | 0105 | -0.1 | 0730 | 4.3 | 1247 | 2.1 | 1842 | 5.8 |
| 6 | 0143 | -0.2 | 0802 | 4.5 | 1327 | 1.8 | 1922 | 5.8 |
| 7 | 0217 | -0.2 | 0830 | 4.7 | 1403 | 1.6 | 1957 | 5.8 |
| 8 | 0244 | -0.1 | 0854 | 4.8 | 1436 | 1.4 | 2032 | 5.7 |
| 9 | 0312 | 0.1 | 0919 | 4.8 | 1507 | 1.3 | 2104 | 5.5 |
| 10 | 0336 | 0.4 | 0942 | 4.9 | 1539 | 1.3 | 2135 | 5.2 |
| 11 | 0401 | 0.7 | 1006 | 4.9 | 1615 | 1.3 | 2208 | 4.8 |
| 12 | 0424 | 1.1 | 1031 | 4.8 | 1650 | 1.3 | 2245 | 4.3 |
| 13 | 0448 | 1.5 | 1059 | 4.8 | 1732 | 1.5 | 2325 | 3.8 |
| 14 | 0513 | 2.0 | 1130 | 4.6 | 1827 | 1.6 | --- | --- |
| 15 | 0526 | 3.4 | 0540 | 2.4 | 1211 | 4.5 | 1947 | 1.7 |
| 16 | 0205 | 3.0 | 0617 | 2.7 | 1311 | 4.4 | 2123 | 1.5 |
| 17 | 0439 | 3.1 | 0747 | 3.0 | 1432 | 4.4 | 2245 | 1.2 |
| 18 | 0547 | 3.4 | 0953 | 3.0 | 1559 | 4.7 | 2338 | 0.7 |
| 19 | 0619 | 3.8 | 1109 | 2.6 | 1704 | 5.1 | --- | --- |
| 20 | 0021 | 0.3 | 0648 | 4.2 | 1205 | 2.3 | 1756 | 5.5 |
| 21 | 0058 | -0.1 | 0714 | 4.6 | 1248 | 1.7 | 1845 | 5.9 |
| 22 | 0133 | -0.3 | 0746 | 5.0 | 1333 | 1.1 | 1931 | 6.1 |
| 23 | 0210 | -0.4 | 0818 | 5.4 | 1416 | 0.6 | 2016 | 6.2 |
| 24 | 0247 | -0.3 | 0850 | 5.8 | 1502 | 0.2 | 2105 | 6.0 |
| 25 | 0324 | 0.0 | 0928 | 6.0 | 1551 | 0.0 | 2153 | 5.5 |
| 26 | 0359 | 0.5 | 1005 | 6.1 | 1642 | -0.1 | 2247 | 5.0 |
| 27 | 0439 | 1.1 | 1048 | 6.0 | 1739 | 0.1 | 2349 | 4.4 |
| 28 | 0524 | 1.7 | 1137 | 5.7 | 1848 | 0.3 | --- | --- |
| 29 | 0610 | 3.8 | 0617 | 2.3 | 1233 | 5.4 | 2010 | 0.5 |
| 30 | 0255 | 3.6 | 0736 | 2.7 | 1350 | 5.0 | 2137 | 0.5 |

ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 21
SAN NICOLAS ISLAND TIDES
33 DEG 16 MIN N, 119 DEG 30 MIN W - CENTRAL PART NE COAST
SEPTEMBER 1940

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0252 | 3.3 | 0807 | 2.1 | 1436 | 4.8 | 2216 | 0.6 |
| 2 | 0445 | 3.3 | 0933 | 2.4 | 1552 | 4.9 | 2332 | 0.4 |
| 3 | 0604 | 3.5 | 1100 | 2.4 | 1706 | 5.0 | --- | --- |
| 4 | 0030 | 0.1 | 0658 | 3.8 | 1208 | 2.2 | 1802 | 5.2 |
| 5 | 0115 | -0.1 | 0737 | 4.0 | 1257 | 1.9 | 1849 | 5.4 |
| 6 | 0153 | -0.2 | 0809 | 4.2 | 1337 | 1.6 | 1929 | 5.4 |
| 7 | 0227 | -0.2 | 0837 | 4.4 | 1413 | 1.5 | 2004 | 5.4 |
| 8 | 0254 | -0.1 | 0901 | 4.5 | 1446 | 1.3 | 2039 | 5.3 |
| 9 | 0322 | 0.1 | 0926 | 4.5 | 1517 | 1.2 | 2111 | 5.1 |
| 10 | 0346 | 0.4 | 0949 | 4.6 | 1549 | 1.2 | 2142 | 4.8 |
| 11 | 0411 | 0.6 | 1013 | 4.6 | 1625 | 1.2 | 2215 | 4.5 |
| 12 | 0434 | 1.0 | 1038 | 4.5 | 1700 | 1.2 | 2252 | 4.0 |
| 13 | 0458 | 1.4 | 1106 | 4.5 | 1742 | 1.4 | 2332 | 3.5 |
| 14 | 0523 | 1.8 | 1137 | 4.3 | 1837 | 1.5 | --- | --- |
| 15 | 0033 | 3.2 | 0550 | 2.2 | 1218 | 4.2 | 1957 | 1.5 |
| 16 | 0212 | 2.8 | 0627 | 2.5 | 1318 | 4.1 | 2133 | 1.4 |
| 17 | 0446 | 2.9 | 0757 | 2.8 | 1439 | 4.1 | 2255 | 1.1 |
| 18 | 0554 | 3.2 | 1003 | 2.5 | 1606 | 4.4 | 2348 | 0.6 |
| 19 | 0626 | 3.5 | 1119 | 2.5 | 1711 | 4.7 | --- | --- |
| 20 | 0031 | 0.3 | 0655 | 3.9 | 1215 | 2.1 | 1803 | 5.1 |
| 21 | 0104 | -0.1 | 0721 | 4.3 | 1258 | 1.5 | 1952 | 5.5 |
| 22 | 0143 | -0.3 | 0753 | 4.6 | 1343 | 1.0 | 1938 | 5.6 |
| 23 | 0220 | -0.4 | 0825 | 5.0 | 1426 | 0.5 | 2023 | 5.7 |
| 24 | 0257 | -0.3 | 0857 | 5.4 | 1512 | 0.2 | 2112 | 5.4 |
| 25 | 0334 | 0.0 | 0935 | 5.6 | 1601 | 0.0 | 2200 | 5.1 |
| 26 | 0409 | 0.5 | 1012 | 5.6 | 1652 | -0.1 | 2254 | 4.6 |
| 27 | 0449 | 1.0 | 1055 | 5.6 | 1749 | 0.1 | 2356 | 4.1 |
| 28 | 0534 | 1.5 | 1144 | 5.3 | 1858 | 0.3 | --- | --- |
| 29 | 0617 | 3.5 | 0627 | 2.1 | 1240 | 5.0 | 2020 | 0.5 |
| 30 | 0302 | 3.4 | 0746 | 2.5 | 1357 | 4.6 | 2147 | 0.5 |

ADD ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

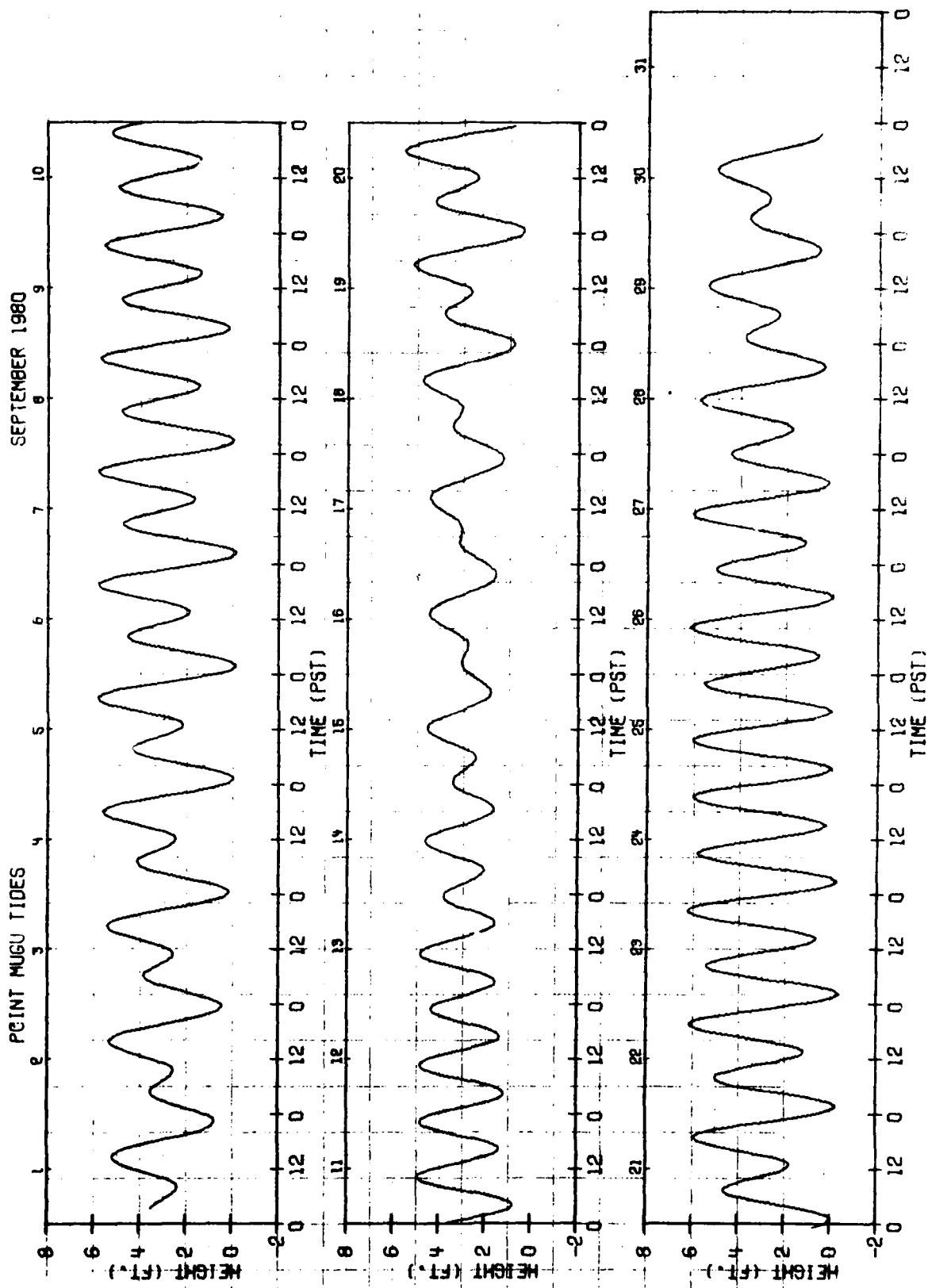


Figure 9. Tidal Graph for Point Mugu, September 1980.

TABLE 22
POINT MUGU TIDES
34 DEG 06 MIN N 119 DEG 06 MIN W - OCEAN PIER

OCTOBER 1980

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0438 | 3.8 | 0924 | 2.8 | 1520 | 0.4 | 2253 | 0.4 |
| 2 | 0544 | 4.1 | 1058 | 2.6 | 1639 | 0.2 | 2351 | 0.2 |
| 3 | 0627 | 4.4 | 1159 | 2.3 | 1741 | --- | --- | --- |
| 4 | 0702 | 4.7 | 1244 | 1.9 | 1830 | 5.2 | 1909 | 5.2 |
| 5 | 0728 | 4.9 | 1320 | 1.5 | 1909 | 5.2 | 1944 | 5.2 |
| 6 | 0753 | 5.0 | 1352 | 1.2 | 1944 | 5.2 | 2017 | 5.1 |
| 7 | 0813 | 5.1 | 1424 | 0.9 | 2017 | 5.1 | 2049 | 4.9 |
| 8 | 0836 | 5.2 | 1452 | 0.7 | 2049 | 4.9 | 2123 | 4.6 |
| 9 | 0856 | 5.3 | 1524 | 0.6 | 2123 | 4.6 | 2159 | 4.3 |
| 10 | 0920 | 5.3 | 1556 | 0.6 | 2159 | 4.3 | 2235 | 4.0 |
| 11 | 0943 | 5.3 | 1631 | 0.6 | 2235 | 4.0 | 2321 | 3.6 |
| 12 | 1008 | 5.2 | 1710 | 0.8 | 2321 | 3.6 | --- | --- |
| 13 | 1037 | 5.0 | 1802 | 0.9 | --- | --- | 1904 | 1.1 |
| 14 | 1069 | 4.8 | 1894 | 1.1 | 1904 | 1.1 | 2027 | 1.1 |
| 15 | 1103 | 4.5 | 1984 | 1.2 | 2027 | 1.1 | 2147 | 0.9 |
| 16 | 1138 | 4.2 | 2072 | 1.2 | 2147 | 0.9 | 2248 | 0.6 |
| 17 | 1174 | 3.9 | 2159 | 1.2 | 2248 | 0.6 | 2336 | 0.3 |
| 18 | 1210 | 3.6 | 2244 | 1.2 | 2336 | 0.3 | --- | --- |
| 19 | 1246 | 3.3 | 2328 | 1.2 | --- | --- | 1829 | 5.3 |
| 20 | 1282 | 3.0 | 2411 | 1.2 | 1829 | 5.3 | 1919 | 5.5 |
| 21 | 1318 | 2.7 | 2493 | 1.2 | 1919 | 5.5 | 2008 | 5.3 |
| 22 | 1354 | 2.4 | 2574 | 1.2 | 2008 | 5.3 | 2057 | 5.3 |
| 23 | 1430 | 2.1 | 2654 | 1.2 | 2057 | 5.3 | 2150 | 4.9 |
| 24 | 1466 | 1.8 | 2733 | 1.2 | 2150 | 4.9 | 2247 | 4.5 |
| 25 | 1502 | 1.5 | 2811 | 1.2 | 2247 | 4.5 | 2351 | 4.1 |
| 26 | 1538 | 1.2 | 2888 | 1.2 | 2351 | 4.1 | --- | --- |
| 27 | 1574 | 0.9 | 2964 | 1.2 | --- | --- | 1941 | 0.1 |
| 28 | 1610 | 0.6 | 3039 | 1.2 | 1941 | 0.1 | 2059 | 0.3 |
| 29 | 1646 | 0.3 | 3113 | 1.2 | 2059 | 0.3 | 2209 | 0.4 |
| 30 | 1682 | 0.0 | 3186 | 1.2 | 2209 | 0.4 | 2309 | 0.5 |
| 31 | 1718 | 0.0 | 3258 | 1.2 | 2309 | 0.5 | --- | --- |

AD(1) ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

TABLE 23

SAN NICOLAS ISLAND TIDES

OCTOBER 1980

33 DEG 16 MIN N 119 DEG 30 MIN W - CENTRAL PART NE COAST

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0445 | 3.5 | 0934 | 2.6 | 1527 | 4.6 | 2303 | 0.4 |
| 2 | 0551 | 3.8 | 1108 | 2.5 | 1646 | 4.6 | 0001 | 0.2 |
| 3 | 0634 | 4.1 | 1209 | 2.1 | 1748 | 4.6 | --- | --- |
| 4 | 0709 | 4.4 | 1300 | 1.7 | 1837 | 4.8 | 1837 | 4.8 |
| 5 | 0735 | 4.6 | 1330 | 1.4 | 1916 | 4.8 | 1916 | 4.8 |
| 6 | 0800 | 4.6 | 1402 | 1.1 | 1951 | 4.8 | 2024 | 4.7 |
| 7 | 0820 | 4.7 | 1434 | 0.8 | 2024 | 4.7 | 2056 | 4.6 |
| 8 | 0843 | 4.8 | 1502 | 0.6 | 2056 | 4.6 | 2130 | 4.3 |
| 9 | 0903 | 4.9 | 1534 | 0.5 | 2130 | 4.3 | 2206 | 4.0 |
| 10 | 0927 | 4.9 | 1606 | 0.5 | 2206 | 4.0 | 2242 | 3.7 |
| 11 | 0950 | 4.9 | 1641 | 0.5 | 2242 | 3.7 | 2328 | 3.4 |
| 12 | 1015 | 4.8 | 1720 | 0.7 | 2328 | 3.4 | --- | --- |
| 13 | 1044 | 4.6 | 1812 | 0.8 | --- | --- | 1914 | 1.0 |
| 14 | 1049 | 4.5 | 1837 | 0.8 | 1914 | 1.0 | 2037 | 1.0 |
| 15 | 1053 | 4.5 | 1864 | 0.8 | 2037 | 1.0 | 2157 | 0.8 |
| 16 | 1055 | 4.5 | 1891 | 0.8 | 2157 | 0.8 | 2254 | 0.5 |
| 17 | 1058 | 4.5 | 1918 | 0.8 | 2254 | 0.5 | --- | --- |
| 18 | 1108 | 4.4 | 1945 | 0.8 | --- | --- | 1836 | 4.9 |
| 19 | 1201 | 1.8 | 2011 | 1.8 | 1741 | 4.6 | 1926 | 5.1 |
| 20 | 1247 | 1.1 | 2065 | 1.1 | 1836 | 4.9 | 2015 | 5.1 |
| 21 | 1333 | 0.5 | 2116 | 0.5 | 1926 | 5.1 | 2104 | 4.9 |
| 22 | 1418 | -0.2 | 2165 | -0.2 | 2015 | 5.1 | 2157 | 4.6 |
| 23 | 1505 | -0.5 | 2214 | -0.5 | 2104 | 4.9 | 2254 | 4.2 |
| 24 | 1551 | -0.7 | 2262 | -0.7 | 2157 | 4.6 | --- | --- |
| 25 | 1641 | -0.7 | 2309 | -0.7 | 2254 | 4.2 | --- | --- |
| 26 | 1737 | -0.5 | 2354 | -0.5 | --- | --- | 1951 | 0.1 |
| 27 | 1839 | -0.3 | --- | --- | 1951 | 0.1 | 2109 | 0.3 |
| 28 | 1939 | -0.1 | 2004 | -0.1 | 2109 | 0.3 | 2219 | 0.4 |
| 29 | 2034 | 0.0 | 2104 | 0.0 | 2219 | 0.4 | --- | --- |
| 30 | 2124 | 0.1 | 2204 | 0.1 | --- | --- | 1614 | 4.0 |
| 31 | 2219 | 0.3 | 2304 | 0.3 | 1614 | 4.0 | --- | --- |

* -- TIME OCCURS ON NEXT DATE.

AD(1) ONE HOUR WHEN DAYLIGHT SAVINGS TIME IS IN EFFECT.

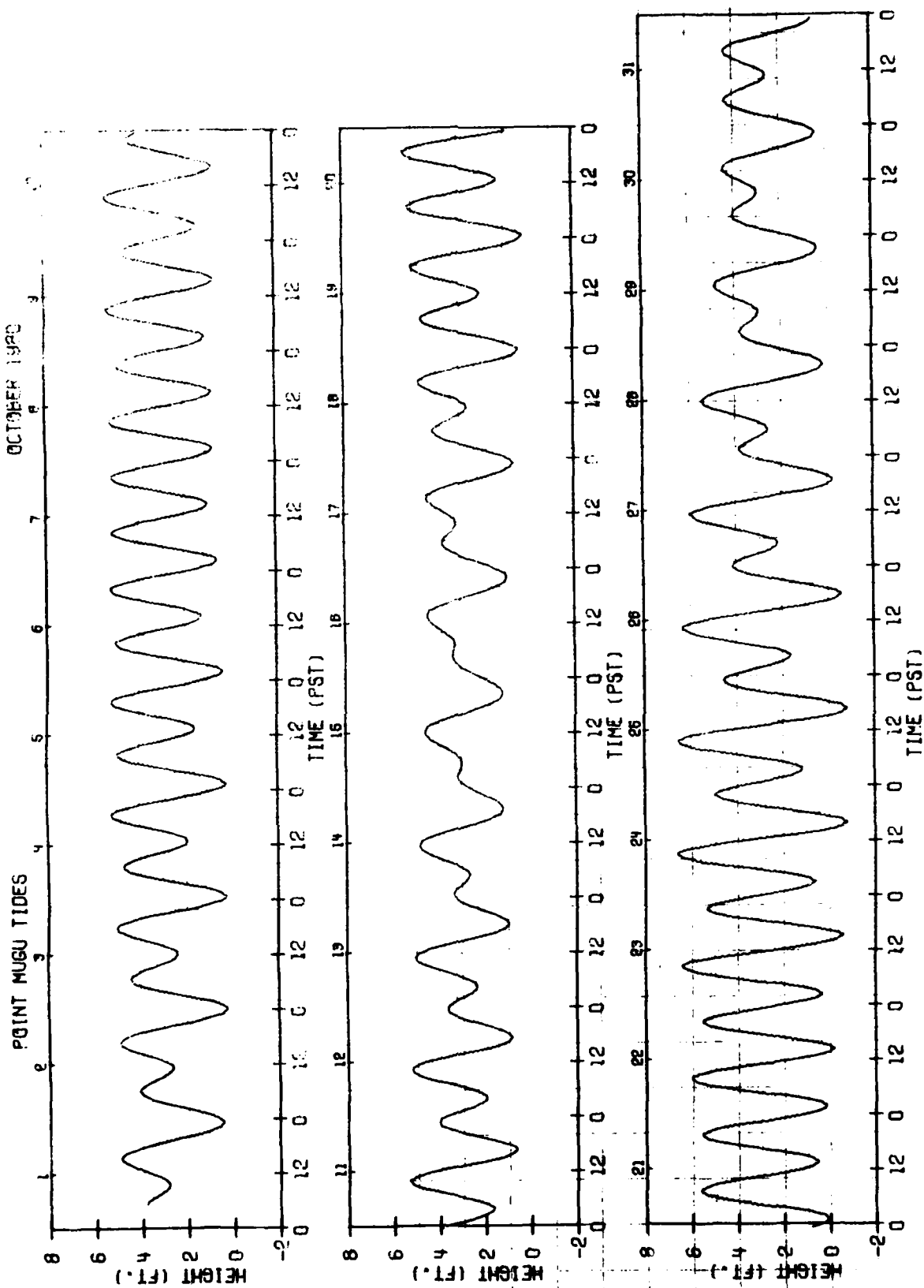


Figure 10. Tidal Graph for Point Mugu, October 1980.

TABLE 24

POINT MUGU TIDES
34 DEG 06 MIN N° 119 DEG 06 MIN W - OCEAN PFR NOVEMBER 1980

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0555 | 4.6 | 1151 | 2.1 | 1715 | 4.3 | 2352 | 0.5 |
| 2 | 0627 | 4.9 | 1231 | 1.7 | 1808 | 4.4 | --- | --- |
| 3 | 0658 | 0.7 | 0652 | 5.1 | 1308 | 1.2 | 1853 | 4.4 |
| 4 | 0100 | 0.8 | 0714 | 5.3 | 1342 | 0.8 | 1930 | 4.4 |
| 5 | 0124 | 1.0 | 0735 | 5.4 | 1411 | 0.5 | 2007 | 4.4 |
| 6 | 0150 | 1.2 | 0757 | 5.6 | 1440 | 0.3 | 2041 | 4.3 |
| 7 | 0215 | 1.4 | 0821 | 5.7 | 1512 | 0.1 | 2117 | 4.1 |
| 8 | 0240 | 1.7 | 0843 | 5.7 | 1544 | 0.0 | 2153 | 3.9 |
| 9 | 0305 | 1.9 | 0909 | 5.6 | 1619 | 0.0 | 2235 | 3.7 |
| 10 | 0330 | 2.2 | 0939 | 5.5 | 1700 | 0.1 | 2325 | 3.5 |
| 11 | 0359 | 2.5 | 1008 | 5.3 | 1745 | 0.2 | --- | --- |
| 12 | 0426 | 3.3 | 0430 | 2.7 | 1045 | 5.1 | 1838 | 0.4 |
| 13 | 0452 | 3.3 | 0526 | 3.0 | 1135 | 4.7 | 1942 | 0.5 |
| 14 | 0518 | 3.5 | 0710 | 3.2 | 1251 | 4.4 | 2052 | 0.5 |
| 15 | 0547 | 3.9 | 0917 | 2.9 | 1430 | 4.2 | 2155 | 0.5 |
| 16 | 0622 | 4.4 | 1043 | 2.4 | 1600 | 4.2 | 2248 | 0.5 |
| 17 | 0657 | 4.9 | 1140 | 1.6 | 1715 | 4.4 | 2335 | 0.5 |
| 18 | 0601 | 5.5 | 1229 | 0.8 | 1816 | 4.5 | --- | --- |
| 19 | 0629 | 0.6 | 0637 | 6.0 | 1317 | 0.0 | 1912 | 4.7 |
| 20 | 0100 | 0.7 | 0712 | 6.4 | 1403 | -0.7 | 2005 | 4.7 |
| 21 | 0141 | 0.9 | 0751 | 6.8 | 1448 | -1.1 | 2058 | 4.6 |
| 22 | 0220 | 1.2 | 0829 | 6.9 | 1534 | -1.3 | 2150 | 4.4 |
| 23 | 0302 | 1.5 | 0910 | 6.8 | 1622 | -1.3 | 2244 | 4.2 |
| 24 | 0347 | 1.9 | 0952 | 6.5 | 1714 | -1.0 | 2343 | 4.0 |
| 25 | 0433 | 2.3 | 1035 | 6.0 | 1806 | -0.6 | --- | --- |
| 26 | 0522 | 3.9 | 0532 | 2.6 | 1126 | 5.4 | 1905 | -0.2 |
| 27 | 0609 | 3.9 | 0651 | 2.9 | 1226 | 4.7 | 2008 | 0.2 |
| 28 | 0624 | 4.0 | 0833 | 2.9 | 1345 | 4.1 | 2111 | 0.5 |
| 29 | 0622 | 4.3 | 1016 | 2.5 | 1514 | 3.8 | 2211 | 0.8 |
| 30 | 0507 | 4.6 | 1124 | 2.1 | 1637 | 3.7 | 2258 | 1.0 |

TABLE 25

SAN NICOLAS ISLAND TIDES
33 DEG 16 MIN N° 119 DEG 30 MIN W - CENTRAL PART NE COAST NOVEMBER 1980

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0602 | 4.3 | 1201 | 1.9 | 1722 | 4.0 | 0002 | 0.5* |
| 2 | 0634 | 4.6 | 1241 | 1.5 | 1815 | 4.1 | --- | --- |
| 3 | 0638 | 0.6 | 0659 | 4.7 | 1318 | 1.1 | 1900 | 4.1 |
| 4 | 0110 | 0.7 | 0721 | 4.9 | 1352 | 0.7 | 1937 | 4.1 |
| 5 | 0134 | 0.9 | 0742 | 5.0 | 1421 | 0.5 | 2014 | 4.1 |
| 6 | 0200 | 1.1 | 0804 | 5.2 | 1450 | 0.3 | 2048 | 4.0 |
| 7 | 0225 | 1.3 | 0828 | 5.3 | 1522 | 0.1 | 2124 | 3.8 |
| 8 | 0315 | 1.5 | 0850 | 5.3 | 1554 | 0.0 | 2200 | 3.6 |
| 9 | 0340 | 1.7 | 0916 | 5.2 | 1629 | 0.0 | 2242 | 3.5 |
| 10 | 0400 | 2.0 | 0946 | 5.1 | 1710 | 0.1 | 2332 | 3.3 |
| 11 | 0409 | 2.3 | 1015 | 4.9 | 1755 | 0.2 | --- | --- |
| 12 | 0433 | 3.1 | 0440 | 2.5 | 1052 | 4.7 | 1848 | 0.4 |
| 13 | 0459 | 3.1 | 0536 | 2.8 | 1142 | 4.4 | 1952 | 0.5 |
| 14 | 0525 | 3.3 | 0720 | 3.0 | 1258 | 4.1 | 2102 | 0.5 |
| 15 | 0624 | 3.6 | 0927 | 2.7 | 1437 | 3.9 | 2205 | 0.5 |
| 16 | 0659 | 4.1 | 1053 | 2.2 | 1607 | 3.9 | 2258 | 0.5 |
| 17 | 0734 | 4.6 | 1150 | 1.5 | 1722 | 4.1 | 2345 | 0.5 |
| 18 | 0808 | 5.1 | 1239 | 0.7 | 1823 | 4.2 | --- | --- |
| 19 | 0830 | 0.5 | 0844 | 5.6 | 1327 | 0.0 | 1914 | 4.4 |
| 20 | 0110 | 0.6 | 0719 | 5.9 | 1413 | -0.6 | 2012 | 4.4 |
| 21 | 0151 | 0.8 | 0758 | 6.3 | 1458 | -1.0 | 2105 | 4.3 |
| 22 | 0230 | 1.1 | 0836 | 6.4 | 1544 | -1.2 | 2157 | 4.1 |
| 23 | 0312 | 1.4 | 0917 | 6.3 | 1632 | -1.2 | 2251 | 3.9 |
| 24 | 0357 | 1.7 | 0959 | 6.0 | 1724 | -0.9 | 2350 | 3.7 |
| 25 | 0443 | 2.1 | 1042 | 5.6 | 1816 | -0.5 | --- | --- |
| 26 | 0529 | 3.6 | 0542 | 2.5 | 1133 | 5.0 | 1915 | -0.2 |
| 27 | 0616 | 3.6 | 0701 | 2.7 | 1233 | 4.4 | 2018 | 0.2 |
| 28 | 0631 | 3.7 | 0843 | 2.7 | 1352 | 3.8 | 2121 | 0.5 |
| 29 | 0629 | 4.0 | 1026 | 2.4 | 1521 | 3.5 | 2221 | 0.7 |
| 30 | 0514 | 4.3 | 1134 | 1.9 | 1644 | 3.5 | 2308 | 0.9 |

* -- TIDE OCCURS ON NEXT DATE.

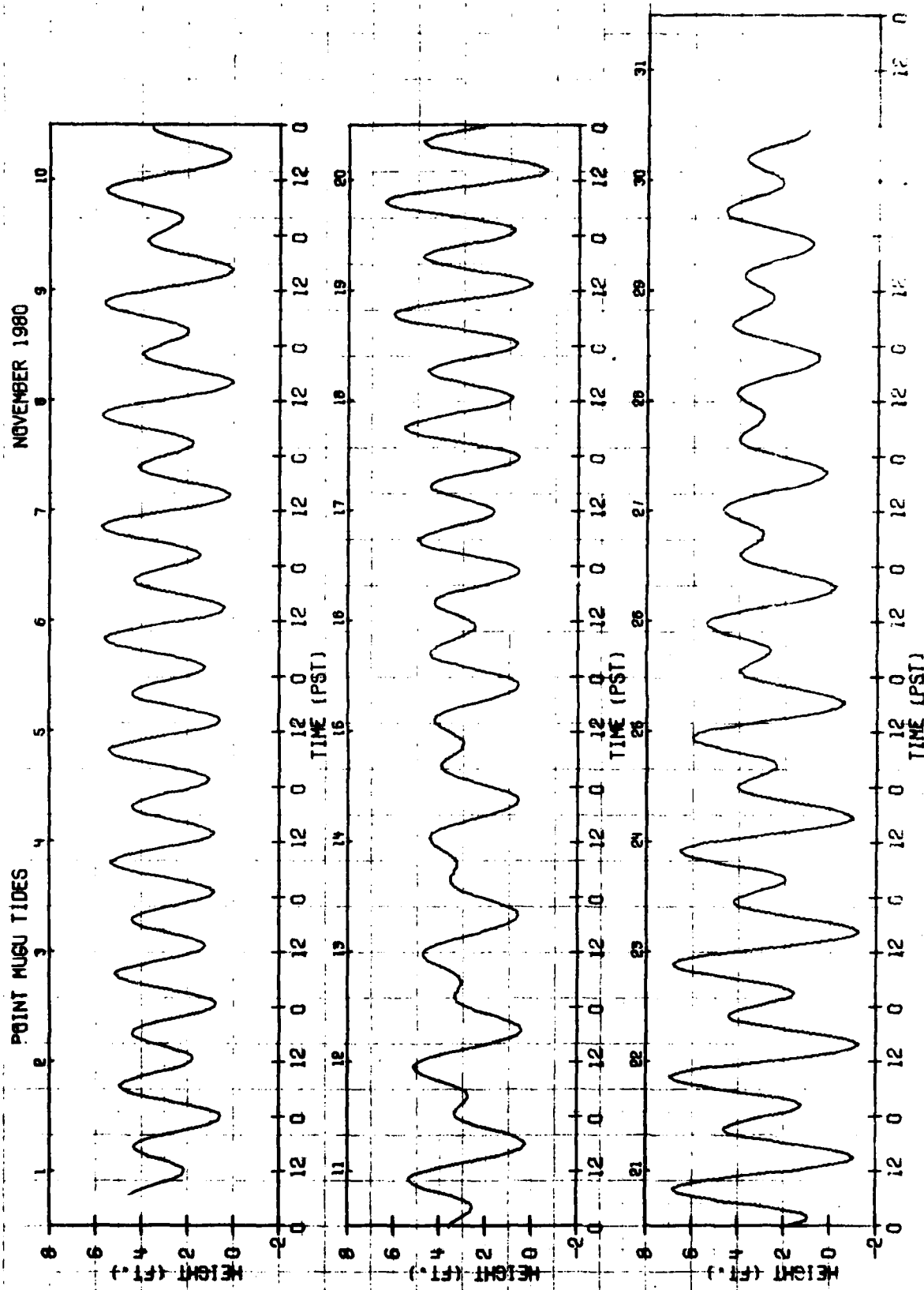


Figure 11. Tidal Graph for Point Mugu, November 1980.

TABLE 26
POINT MUGU TIDES

34 DEG 06 MIN N 119 DEG 06 MIN W - OCEAN PIER

DECEMBER 1940

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0542 | 4.8 | 1214 | 1.6 | 1747 | 3.7 | 2341 | 1.2 |
| 2 | 0609 | 5.1 | 1252 | 1.1 | 1835 | 3.7 | 1920 | 3.4 |
| 3 | 0015 | 1.4 | 0637 | 5.3 | 1324 | 0.6 | 1959 | 3.4 |
| 4 | 0045 | 1.5 | 0700 | 5.5 | 1401 | 0.2 | 2034 | 3.4 |
| 5 | 0114 | 1.7 | 0726 | 5.7 | 1431 | 0.1 | 2115 | 3.4 |
| 6 | 0143 | 1.8 | 0751 | 5.9 | 1503 | 0.3 | 2153 | 3.7 |
| 7 | 0212 | 2.0 | 0819 | 5.9 | 1535 | 0.4 | 2234 | 3.6 |
| 8 | 0239 | 2.1 | 0844 | 5.9 | 1610 | 0.5 | 2314 | 3.6 |
| 9 | 0312 | 2.3 | 0920 | 5.8 | 1644 | 0.5 | 2341 | 3.6 |
| 10 | 0350 | 2.5 | 0955 | 5.6 | 1727 | 0.3 | 1814 | 0.2 |
| 11 | 0012 | 3.6 | 0433 | 2.6 | 1037 | 5.3 | 1904 | 0.1 |
| 12 | 0108 | 3.6 | 0534 | 2.7 | 1124 | 4.9 | 2000 | 0.3 |
| 13 | 0211 | 3.4 | 0701 | 2.8 | 1232 | 4.4 | 2101 | 0.6 |
| 14 | 0307 | 4.2 | 0846 | 2.5 | 1354 | 4.0 | 2200 | 0.4 |
| 15 | 0359 | 4.6 | 1019 | 2.0 | 1535 | 3.7 | 2256 | 1.0 |
| 16 | 0445 | 5.1 | 1124 | 1.2 | 1702 | 3.7 | 2344 | 1.2 |
| 17 | 0527 | 5.6 | 1224 | 0.4 | 1813 | 3.8 | 1914 | 4.0 |
| 18 | 0608 | 6.1 | 1312 | 0.4 | 1914 | 4.0 | 2009 | 4.1 |
| 19 | 0034 | 1.3 | 0649 | 6.5 | 1350 | 1.0 | 2101 | 4.2 |
| 20 | 0119 | 1.4 | 0731 | 6.4 | 1443 | 1.4 | 2147 | 4.2 |
| 21 | 0204 | 1.5 | 0813 | 6.9 | 1527 | 1.5 | 2235 | 4.1 |
| 22 | 0244 | 1.7 | 0855 | 6.7 | 1612 | 1.4 | 2325 | 4.0 |
| 23 | 0332 | 1.9 | 0937 | 6.4 | 1655 | 1.2 | 1824 | 0.3 |
| 24 | 0420 | 2.2 | 1019 | 5.9 | 1740 | 0.8 | 1912 | 0.2 |
| 25 | 0017 | 4.0 | 0510 | 2.4 | 1801 | 5.3 | 2002 | 0.7 |
| 26 | 0111 | 4.0 | 0612 | 2.5 | 1847 | 4.7 | 2054 | 1.1 |
| 27 | 0212 | 4.0 | 0734 | 2.6 | 1947 | 4.0 | 2150 | 1.4 |
| 28 | 0311 | 4.1 | 0812 | 2.5 | 2045 | 3.4 | 2243 | 1.7 |
| 29 | 0402 | 4.3 | 1046 | 2.1 | 2144 | 3.1 | 2324 | 1.9 |
| 30 | 0446 | 4.6 | 1150 | 1.6 | 2241 | 3.0 | | |
| 31 | 0524 | 4.4 | 1236 | 1.1 | 2321 | 3.1 | | |

TABLE 27

SAN NICOLAS ISLAND TIDES

33 DEG 14 MIN N 119 DEG 30 MIN W - CENTRAL PART NE COAST

DECEMBER 1940

| DATE | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT | TIME PST | HGT FT |
|------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| 1 | 0544 | 4.5 | 1224 | 1.5 | 1749 | 3.5 | 2351 | 1.1 |
| 2 | 0616 | 4.7 | 1302 | 1.0 | 1842 | 3.5 | 1927 | 3.5 |
| 3 | 0025 | 1.3 | 0644 | 4.9 | 1334 | 0.5 | 2006 | 3.5 |
| 4 | 0054 | 1.4 | 0707 | 5.1 | 1411 | 0.2 | 2045 | 3.5 |
| 5 | 0124 | 1.5 | 0733 | 5.3 | 1441 | 0.1 | 2122 | 3.5 |
| 6 | 0153 | 1.6 | 0758 | 5.5 | 1513 | 0.3 | 2200 | 3.5 |
| 7 | 0222 | 1.4 | 0826 | 5.5 | 1545 | 0.4 | 2240 | 3.5 |
| 8 | 0249 | 1.9 | 0855 | 5.5 | 1620 | 0.5 | 2325 | 3.4 |
| 9 | 0322 | 2.1 | 0927 | 5.4 | 1656 | 0.5 | 1737 | 0.3 |
| 10 | 0400 | 2.3 | 1002 | 5.2 | 1737 | 0.3 | 1824 | 0.2 |
| 11 | 0019 | 3.4 | 0443 | 2.5 | 1044 | 4.9 | 1914 | 0.1 |
| 12 | 0115 | 3.4 | 0546 | 2.5 | 1133 | 4.6 | 2010 | 0.3 |
| 13 | 0214 | 3.5 | 0711 | 2.6 | 1239 | 4.1 | 2111 | 0.5 |
| 14 | 0314 | 3.4 | 0856 | 2.4 | 1405 | 3.7 | 2210 | 0.7 |
| 15 | 0404 | 4.3 | 1029 | 1.8 | 1542 | 3.5 | 2306 | 0.9 |
| 16 | 0452 | 4.7 | 1134 | 1.1 | 1709 | 3.5 | 1820 | 3.5 |
| 17 | 0534 | 5.2 | 1234 | 0.4 | 1820 | 3.5 | 1921 | 3.7 |
| 18 | 0615 | 5.4 | 1322 | 0.4 | 1921 | 3.7 | 2016 | 3.4 |
| 19 | 0044 | 1.2 | 0656 | 6.0 | 1409 | 0.9 | 2104 | 3.9 |
| 20 | 0124 | 1.3 | 0734 | 6.3 | 1453 | 1.3 | 2154 | 3.9 |
| 21 | 0214 | 1.5 | 0820 | 6.4 | 1537 | 1.4 | 2242 | 3.4 |
| 22 | 0254 | 1.5 | 0902 | 6.2 | 1622 | 1.3 | 2332 | 3.7 |
| 23 | 0342 | 1.7 | 0944 | 5.9 | 1705 | 1.1 | 1834 | 0.3 |
| 24 | 0430 | 2.0 | 1024 | 5.5 | 1750 | 0.7 | 1922 | 0.2 |
| 25 | 0024 | 3.7 | 0520 | 2.2 | 1104 | 4.9 | 2012 | 0.6 |
| 26 | 0114 | 3.7 | 0622 | 2.4 | 1154 | 4.4 | 2104 | 1.0 |
| 27 | 0214 | 3.7 | 0744 | 2.5 | 1254 | 3.7 | 2200 | 1.3 |
| 28 | 0314 | 3.4 | 0822 | 2.4 | 1412 | 3.2 | 2253 | 1.5 |
| 29 | 0404 | 4.0 | 1056 | 1.9 | 1541 | 2.9 | 2334 | 1.7 |
| 30 | 0453 | 4.3 | 1200 | 1.5 | 1722 | 2.4 | | |
| 31 | 0531 | 4.5 | 1244 | 1.0 | 1824 | 2.9 | | |

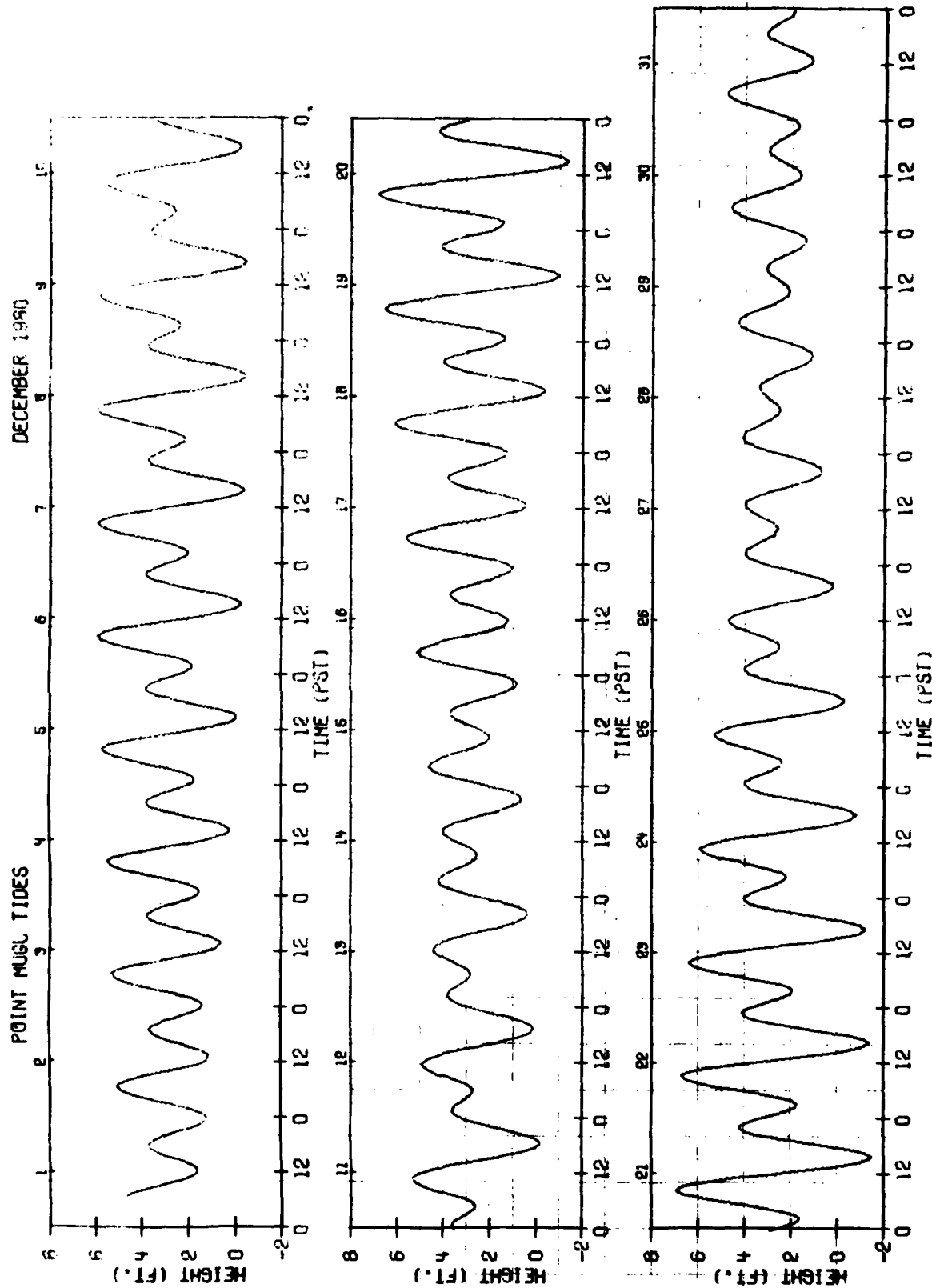


Figure 12. Tidal Graph for Point Mugu, December 1980.

Table 28. Moonrise and Moonset, Barking Sands, Hawaii, 1980

| Date | January | | February | | March | | April | | May | | June | | Date |
|------|---------|------|----------|------|-------|------|-------|------|------|------|------|------|------|
| | Rise | Set | Rise | Set | Rise | Set | Rise | Set | Rise | Set | Rise | Set | |
| 1 | 1758 | 0638 | 1920 | 0742 | 1855 | 0700 | 2008 | 0724 | 2038 | 0720 | 2208 | 0832 | 1 |
| 2 | 1851 | 0730 | 2011 | 0822 | 1944 | 0736 | 2058 | 0801 | 2131 | 0804 | 2259 | 0929 | 2 |
| 3 | 1944 | 0819 | 2100 | 0900 | 2033 | 0812 | 2149 | 0840 | 2225 | 0851 | 2347 | 1027 | 3 |
| 4 | 2037 | 0904 | 2149 | 0936 | 2122 | 0847 | 2242 | 0921 | 2318 | 0942 | 2427 | 1127 | 4 |
| 5 | 2128 | 0946 | 2237 | 1012 | 2211 | 0923 | 2335 | 1006 | 2411 | 1037 | 0033 | 1226 | 5 |
| 6 | 2217 | 1025 | 2326 | 1047 | 2302 | 1001 | 2427 | 1054 | 0010 | 1134 | 0118 | 1326 | 6 |
| 7 | 2306 | 1102 | 2414 | 1124 | 2353 | 1040 | 0028 | 1146 | 0100 | 1232 | 0201 | 1426 | 7 |
| 8 | 2355 | 1137 | 0016 | 1202 | 0000 | 1123 | 0122 | 1242 | 0148 | 1332 | 0245 | 1527 | 8 |
| 9 | 0000 | 1213 | 0108 | 1244 | 0046 | 1209 | 0214 | 1341 | 0234 | 1433 | 0330 | 1628 | 9 |
| 10 | 0044 | 1249 | 0201 | 1329 | 0141 | 1300 | 0304 | 1442 | 0320 | 1535 | 0417 | 1730 | 10 |
| 11 | 0134 | 1327 | 0257 | 1419 | 0236 | 1355 | 0353 | 1545 | 0405 | 1637 | 0506 | 1832 | 11 |
| 12 | 0226 | 1407 | 0353 | 1513 | 0330 | 1454 | 0441 | 1648 | 0450 | 1740 | 0559 | 1932 | 12 |
| 13 | 0320 | 1452 | 0450 | 1612 | 0424 | 1557 | 0528 | 1752 | 0538 | 1844 | 0653 | 2029 | 13 |
| 14 | 0415 | 1540 | 0546 | 1715 | 0516 | 1701 | 0615 | 1857 | 0627 | 1947 | 0749 | 2121 | 14 |
| 15 | 0513 | 1634 | 0640 | 1820 | 0606 | 1806 | 0702 | 2001 | 0719 | 2048 | 0844 | 2210 | 15 |
| 16 | 0611 | 1732 | 0731 | 1925 | 0654 | 1911 | 0751 | 2104 | 0812 | 2147 | 0939 | 2254 | 16 |
| 17 | 0708 | 1833 | 0820 | 2029 | 0741 | 2015 | 0841 | 2206 | 0907 | 2241 | 1032 | 2334 | 17 |
| 18 | 0803 | 1937 | 0907 | 2132 | 0828 | 2119 | 0933 | 2305 | 1003 | 2331 | 1123 | 2427 | 18 |
| 19 | 0855 | 2040 | 0953 | 2234 | 0916 | 2221 | 1027 | 2397 | 1057 | 2427 | 1213 | 0012 | 19 |
| 20 | 0943 | 2143 | 1038 | 2335 | 1004 | 2322 | 1120 | 0000 | 1150 | 0017 | 1302 | 0048 | 20 |
| 21 | 1030 | 2245 | 1124 | 0000 | 1054 | 0000 | 1214 | 0051 | 1241 | 0058 | 1350 | 0123 | 21 |
| 22 | 1114 | 2345 | 1211 | 0034 | 1144 | 0020 | 1306 | 0138 | 1331 | 0137 | 1440 | 0158 | 22 |
| 23 | 1158 | 0000 | 1300 | 0132 | 1236 | 0116 | 1357 | 0220 | 1420 | 0213 | 1530 | 0235 | 23 |
| 24 | 1242 | 0044 | 1350 | 0228 | 1328 | 0207 | 1447 | 0300 | 1509 | 0249 | 1622 | 0313 | 24 |
| 25 | 1327 | 0143 | 1441 | 0321 | 1420 | 0256 | 1537 | 0338 | 1558 | 0324 | 1716 | 0355 | 25 |
| 26 | 1413 | 0240 | 1532 | 0410 | 1511 | 0340 | 1625 | 0414 | 1648 | 0400 | 1811 | 0440 | 26 |
| 27 | 1502 | 0337 | 1624 | 0457 | 1602 | 0421 | 1714 | 0449 | 1739 | 0437 | 1906 | 0530 | 27 |
| 28 | 1553 | 0431 | 1715 | 0541 | 1652 | 0500 | 1803 | 0524 | 1832 | 0517 | 2001 | 0623 | 28 |
| 29 | 1644 | 0524 | 1806 | 0621 | 1741 | 0537 | 1854 | 0601 | 1926 | 0600 | 2054 | 0720 | 29 |
| 30 | 1737 | 0613 | 1859 | 0709 | 1829 | 0613 | 1945 | 0639 | 2020 | 0647 | 2145 | 0820 | 30 |
| 31 | 1829 | 0659 | 1951 | 0741 | 1918 | 0648 | 2011 | 0702 | 2115 | 0738 | 2210 | 0900 | 31 |

| Date | July | | August | | September | | October | | November | | December | | Date |
|------|------|------|--------|------|-----------|------|---------|------|----------|------|----------|------|------|
| | Rise | Set | Rise | Set | Rise | Set | Rise | Set | Rise | Set | Rise | Set | |
| 1 | 2233 | 0920 | 2328 | 1114 | 2414 | 1308 | 0015 | 1350 | 0143 | 1445 | 0208 | 1433 | 1 |
| 2 | 2318 | 1021 | 2414 | 1215 | 0034 | 1406 | 0109 | 1439 | 0234 | 1522 | 0257 | 1508 | 2 |
| 3 | 0000 | 1121 | 0012 | 1315 | 0126 | 1501 | 0203 | 1524 | 0324 | 1557 | 0345 | 1543 | 3 |
| 4 | 0002 | 1221 | 0058 | 1414 | 0220 | 1552 | 0256 | 1605 | 0413 | 1632 | 0435 | 1620 | 4 |
| 5 | 0045 | 1320 | 0147 | 1513 | 0313 | 1640 | 0347 | 1644 | 0501 | 1707 | 0525 | 1659 | 5 |
| 6 | 0128 | 1420 | 0237 | 1610 | 0407 | 1724 | 0438 | 1720 | 0550 | 1743 | 0617 | 1741 | 6 |
| 7 | 0213 | 1520 | 0330 | 1704 | 0500 | 1805 | 0527 | 1756 | 0640 | 1821 | 0709 | 1827 | 7 |
| 8 | 0300 | 1620 | 0424 | 1755 | 0551 | 1843 | 0616 | 1831 | 0730 | 1901 | 0802 | 1916 | 8 |
| 9 | 0350 | 1720 | 0519 | 1842 | 0641 | 1920 | 0705 | 1906 | 0822 | 1944 | 0855 | 2009 | 9 |
| 10 | 0442 | 1817 | 0612 | 1926 | 0731 | 1955 | 0754 | 1943 | 0914 | 2030 | 0946 | 2104 | 10 |
| 11 | 0537 | 1911 | 0705 | 2006 | 0820 | 2030 | 0843 | 2021 | 1006 | 2120 | 1035 | 2201 | 11 |
| 12 | 0632 | 2001 | 0757 | 2044 | 0908 | 2106 | 0934 | 2102 | 1057 | 2213 | 1121 | 2258 | 12 |
| 13 | 0727 | 2048 | 0847 | 2120 | 0957 | 2143 | 1025 | 2145 | 1147 | 2308 | 1206 | 2356 | 13 |
| 14 | 0821 | 2130 | 0936 | 2155 | 1047 | 2222 | 1117 | 2233 | 1236 | 2411 | 1249 | 2447 | 14 |
| 15 | 0914 | 2209 | 1025 | 2231 | 1138 | 2304 | 1209 | 2324 | 1322 | 0005 | 1331 | 0055 | 15 |
| 16 | 1004 | 2246 | 1114 | 2307 | 1230 | 2350 | 1301 | 2411 | 1407 | 0104 | 1414 | 0155 | 16 |
| 17 | 1054 | 2322 | 1203 | 2345 | 1323 | 2443 | 1351 | 0019 | 1451 | 0204 | 1459 | 0255 | 17 |
| 18 | 1143 | 2357 | 1254 | 2416 | 1416 | 0039 | 1440 | 0116 | 1535 | 0305 | 1546 | 0358 | 18 |
| 19 | 1232 | 0000 | 1346 | 0025 | 1509 | 0133 | 1527 | 0216 | 1621 | 0407 | 1637 | 0501 | 19 |
| 20 | 1321 | 0032 | 1440 | 0110 | 1601 | 0231 | 1614 | 0317 | 1708 | 0511 | 1731 | 0605 | 20 |
| 21 | 1412 | 0109 | 1534 | 0158 | 1651 | 0332 | 1700 | 0420 | 1759 | 0616 | 1828 | 0708 | 21 |
| 22 | 1504 | 0149 | 1629 | 0252 | 1739 | 0435 | 1746 | 0524 | 1852 | 0722 | 1927 | 0807 | 22 |
| 23 | 1558 | 0232 | 1723 | 0349 | 1827 | 0538 | 1834 | 0629 | 1949 | 0826 | 2025 | 0902 | 23 |
| 24 | 1653 | 0319 | 1815 | 0450 | 1913 | 0643 | 1924 | 0735 | 2046 | 0927 | 2122 | 0952 | 24 |
| 25 | 1749 | 0411 | 1905 | 0552 | 2000 | 0747 | 2015 | 0840 | 2144 | 1024 | 2217 | 1037 | 25 |
| 26 | 1844 | 0507 | 1952 | 0656 | 2048 | 0852 | 2110 | 0944 | 2241 | 1115 | 2310 | 1118 | 26 |
| 27 | 1937 | 0606 | 2038 | 0800 | 2137 | 0956 | 2205 | 1045 | 2336 | 1201 | 2401 | 1156 | 27 |
| 28 | 2027 | 0708 | 2124 | 0903 | 2228 | 1058 | 2301 | 1142 | 2427 | 1243 | 0000 | 1232 | 28 |
| 29 | 2114 | 0810 | 2209 | 1005 | 2321 | 1159 | 2357 | 1235 | 0028 | 1322 | 0050 | 1307 | 29 |
| 30 | 2200 | 0912 | 2256 | 1107 | 2411 | 1256 | 2443 | 1322 | 0119 | 1358 | 0138 | 1342 | 30 |
| 31 | 2244 | 1014 | 2344 | 1208 | 2500 | 1356 | 0051 | 1405 | 0211 | 1451 | 0227 | 1418 | 31 |

TABLE 29

PORT ALLEN TIDES

JANUARY 1980

21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPPEE BAY

| DATE | TIME AHST | HGT FT | TIME AHST | HGT FT | TIME AHST | HGT FT | TIME AHST | HGT FT |
|------|--------------|-----------|--------------|-----------|--------------|-----------|--------------|-----------|
| 1 | 0311 | 2.1 | 1037 | 0.2 | 1454 | 0.6 | 2034 | -0.2 |
| 2 | 0344 | 2.1 | 1113 | 0.1 | 1535 | 0.6 | 2110 | -0.1 |
| 3 | 0422 | 2.0 | 1151 | 0.1 | 1617 | 0.6 | 2143 | 0.0 |
| 4 | 0455 | 1.9 | 1226 | 0.1 | 1700 | 0.6 | 2220 | 0.1 |
| 5 | 0527 | 1.8 | 1302 | 0.2 | 1750 | 0.6 | 2254 | 0.2 |
| 6 | 0603 | 1.7 | 1337 | 0.2 | 1846 | 0.6 | ---- | ---- |
| 7 | 2341 | 0.4* | 0635 | 1.6 | 1413 | 0.1 | 1955 | 0.7 |
| 8 | 0035 | 0.5 | 0714 | 1.4 | 1451 | 0.1 | 2113 | 0.8 |
| 9 | 0156 | 0.6 | 0755 | 1.2 | 1532 | 0.1 | 2227 | 1.0 |
| 10 | 0348 | 0.7 | 0847 | 1.0 | 1613 | 0.1 | ---- | ---- |
| 11 | 2325 | 1.2* | 0543 | 0.6 | 0949 | 0.9 | 1655 | 0.0 |
| 12 | 0010 | 1.5 | 0707 | 0.6 | 1058 | 0.8 | 1734 | 0.0 |
| 13 | 0053 | 1.7 | 0806 | 0.5 | 1202 | 0.7 | 1816 | -0.1 |
| 14 | 0132 | 1.8 | 0851 | 0.3 | 1300 | 0.6 | 1858 | -0.2 |
| 15 | 0211 | 2.0 | 0930 | 0.2 | 1351 | 0.6 | 1938 | -0.2 |
| 16 | 0249 | 2.1 | 1010 | 0.1 | 1437 | 0.6 | 2019 | -0.3 |
| 17 | 0328 | 2.2 | 1047 | 0.0 | 1524 | 0.7 | 2104 | -0.3 |
| 18 | 0405 | 2.2 | 1125 | 0.0 | 1610 | 0.7 | 2147 | -0.2 |
| 19 | 0447 | 2.1 | 1204 | -0.1 | 1703 | 0.7 | 2235 | -0.1 |
| 20 | 0527 | 1.9 | 1243 | -0.1 | 1802 | 0.8 | 2329 | 0.1 |
| 21 | 0609 | 1.7 | 1325 | -0.1 | 1911 | 0.9 | ---- | ---- |
| 22 | 0033 | 0.3 | 0652 | 1.6 | 1410 | -0.1 | 2027 | 1.0 |
| 23 | 0156 | 0.5 | 0741 | 1.3 | 1456 | -0.1 | 2149 | 1.2 |
| 24 | 0345 | 0.6 | 0837 | 1.0 | 1546 | -0.1 | 2301 | 1.4 |
| 25 | 0547 | 0.6 | 0949 | 0.8 | 1638 | -0.1 | ---- | ---- |
| 26 | 0003 | 1.6 | 0717 | 0.5 | 1109 | 0.7 | 1730 | -0.1 |
| 27 | 0053 | 1.7 | 0825 | 0.4 | 1221 | 0.6 | 1820 | -0.1 |
| 28 | 0139 | 1.9 | 0905 | 0.2 | 1319 | 0.6 | 1905 | -0.1 |
| 29 | 0220 | 1.9 | 0943 | 0.2 | 1406 | 0.6 | 1945 | -0.1 |
| 30 | 0255 | 2.0 | 1015 | 0.1 | 1447 | 0.6 | 2025 | -0.1 |
| 31 | 0328 | 1.9 | 1044 | 0.1 | 1525 | 0.7 | 2101 | -0.1 |

* -- TIDE OCCURS ON PREVIOUS DATE.

TABLE 30
PORT ALLEN TIDES
21 DEG 54 MIN N 159 DEG 35 MIN W - MANAPPE RAY
FEBRUARY 1980

| DATE | TIME AHST | HGT FT | TIME AHST | HGT FT | TIME AHST | HGT FT | TIME AHST | HGT FT |
|------|--------------|-----------|--------------|-----------|--------------|-----------|--------------|-----------|
| 1 | 0357 | 1.9 | 1109 | 0.1 | 1601 | 0.7 | 2136 | 0.0 |
| 2 | 0429 | 1.8 | 1138 | 0.1 | 1639 | 0.8 | 2211 | 0.1 |
| 3 | 0455 | 1.7 | 1206 | 0.1 | 1718 | 0.8 | 2250 | 0.2 |
| 4 | 0526 | 1.6 | 1235 | 0.1 | 1803 | 0.9 | 2332 | 0.3 |
| 5 | 0555 | 1.5 | 1302 | 0.1 | 1856 | 0.9 | ---- | ---- |
| 6 | 0024 | 0.5 | 0627 | 1.3 | 1335 | 0.1 | 2001 | 1.0 |
| 7 | 0133 | 0.6 | 0702 | 1.1 | 1412 | 0.1 | 2110 | 1.1 |
| 8 | 0319 | 0.6 | 0751 | 0.9 | 1458 | 0.1 | 2225 | 1.3 |
| 9 | 0522 | 0.6 | 0857 | 0.7 | 1552 | 0.1 | ---- | ---- |
| 10 | 2325 | 1.5* | 0655 | 0.5 | 1026 | 0.6 | 1648 | 0.0 |
| 11 | 0018 | 1.7 | 0750 | 0.4 | 1149 | 0.6 | 1744 | -0.1 |
| 12 | 0104 | 1.8 | 0829 | 0.2 | 1249 | 0.6 | 1836 | -0.1 |
| 13 | 0145 | 1.9 | 0904 | 0.1 | 1340 | 0.7 | 1925 | -0.2 |
| 14 | 0227 | 2.0 | 0936 | 0.0 | 1427 | 0.8 | 2014 | -0.3 |
| 15 | 0305 | 2.1 | 1012 | -0.1 | 1513 | 0.9 | 2102 | -0.2 |
| 16 | 0345 | 2.0 | 1047 | -0.1 | 1602 | 1.0 | 2151 | -0.2 |
| 17 | 0424 | 1.9 | 1121 | -0.1 | 1651 | 1.1 | 2243 | -0.1 |
| 18 | 0503 | 1.7 | 1155 | -0.1 | 1745 | 1.2 | ---- | ---- |
| 19 | 2337 | 0.1* | 0541 | 1.6 | 1233 | -0.1 | 1842 | 1.2 |
| 20 | 0043 | 0.3 | 0624 | 1.3 | 1315 | -0.1 | 1951 | 1.3 |
| 21 | 0205 | 0.5 | 0712 | 1.0 | 1401 | 0.0 | 2104 | 1.4 |
| 22 | 0353 | 0.6 | 0811 | 0.8 | 1453 | 0.0 | 2223 | 1.5 |
| 23 | 0556 | 0.5 | 0937 | 0.6 | 1556 | 0.0 | ---- | ---- |
| 24 | 2331 | 1.6* | 0712 | 0.4 | 1112 | 0.6 | 1701 | 0.0 |
| 25 | 0028 | 1.7 | 0804 | 0.3 | 1226 | 0.6 | 1800 | 0.0 |
| 26 | 0116 | 1.7 | 0839 | 0.2 | 1317 | 0.6 | 1853 | 0.0 |
| 27 | 0156 | 1.7 | 0908 | 0.1 | 1359 | 0.7 | 1938 | 0.0 |
| 28 | 0231 | 1.7 | 0936 | 0.1 | 1436 | 0.8 | 2020 | 0.0 |
| 29 | 0303 | 1.7 | 0959 | 0.1 | 1510 | 0.9 | 2056 | 0.0 |

* -- TIDE OCCURS ON PREVIOUS DATE.

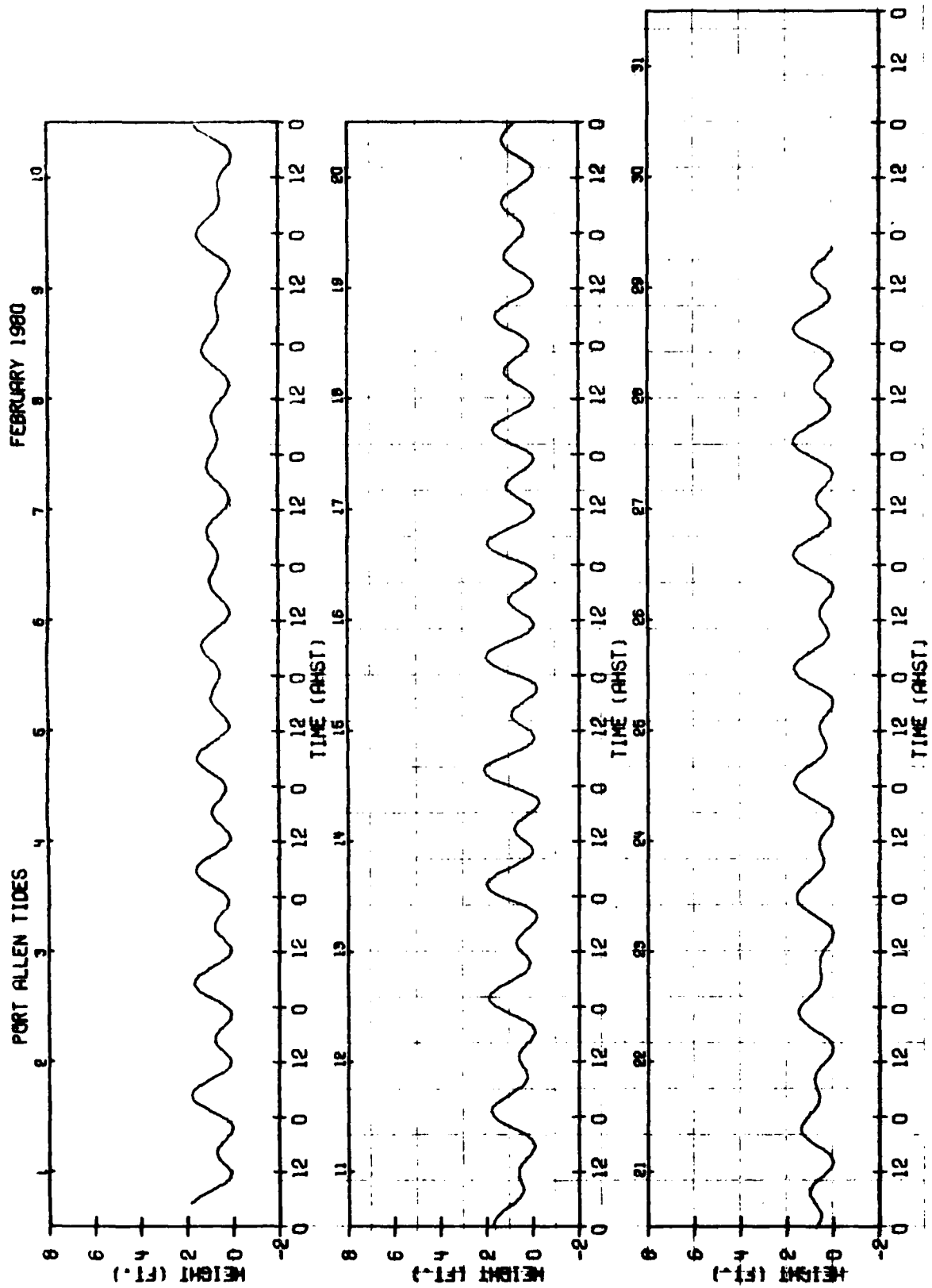


Figure 14. Tidal Graph for Port Allen, February 1980.

TABLE 31

PORT ALLEN TIDES

MARCH 1980

21 DEG 54 MIN N, 159 DEG 35 MIN W - MANAPPEE BAY

| DATE | TIME AHST | HGT FT | TIME AHST | HGT FT | TIME AHST | HGT FT | TIME AHST | HGT FT |
|------|--------------|-----------|--------------|-----------|--------------|-----------|--------------|-----------|
| 1 | 0324 | 1.7 | 1022 | 0.1 | 1542 | 1.0 | 2134 | 0.0 |
| 2 | 0357 | 1.6 | 1045 | 0.1 | 1616 | 1.0 | 2210 | 0.1 |
| 3 | 0423 | 1.5 | 1107 | 0.1 | 1652 | 1.1 | 2249 | 0.2 |
| 4 | 0451 | 1.4 | 1132 | 0.1 | 1728 | 1.2 | 2332 | 0.3 |
| 5 | 0519 | 1.2 | 1157 | 0.1 | 1812 | 1.2 | ---- | ---- |
| 6 | 0024 | 0.4 | 0551 | 1.0 | 1227 | 0.1 | 1905 | 1.2 |
| 7 | 0132 | 0.5 | 0624 | 0.9 | 1301 | 0.1 | 2008 | 1.3 |
| 8 | 0306 | 0.6 | 0712 | 0.7 | 1347 | 0.1 | 2120 | 1.4 |
| 9 | 0501 | 0.5 | 0834 | 0.6 | 1450 | 0.2 | 2233 | 1.5 |
| 10 | 0622 | 0.4 | 1021 | 0.6 | 1605 | 0.1 | ---- | ---- |
| 11 | 2334 | 1.7* | 0711 | 0.3 | 1144 | 0.6 | 1718 | 0.1 |
| 12 | 0028 | 1.7 | 0750 | 0.1 | 1242 | 0.7 | 1820 | 0.0 |
| 13 | 0116 | 1.8 | 0822 | 0.0 | 1334 | 0.8 | 1919 | -0.1 |
| 14 | 0154 | 1.8 | 0856 | -0.1 | 1417 | 1.0 | 2011 | -0.2 |
| 15 | 0238 | 1.8 | 0929 | -0.2 | 1504 | 1.2 | 2104 | -0.2 |
| 16 | 0318 | 1.7 | 1001 | -0.2 | 1546 | 1.3 | 2156 | -0.1 |
| 17 | 0359 | 1.6 | 1033 | -0.2 | 1635 | 1.5 | 2249 | 0.0 |
| 18 | 0438 | 1.4 | 1108 | -0.2 | 1721 | 1.5 | ---- | ---- |
| 19 | 2348 | 0.1* | 0519 | 1.2 | 1141 | -0.1 | 1816 | 1.6 |
| 20 | 0054 | 0.3 | 0601 | 0.9 | 1220 | -0.1 | 1915 | 1.6 |
| 21 | 0218 | 0.4 | 0653 | 0.7 | 1302 | 0.0 | 2021 | 1.6 |
| 22 | 0357 | 0.4 | 0803 | 0.6 | 1357 | 0.1 | 2134 | 1.6 |
| 23 | 0534 | 0.3 | 0943 | 0.6 | 1513 | 0.2 | 2248 | 1.6 |
| 24 | 0639 | 0.3 | 1120 | 0.6 | 1630 | 0.2 | ---- | ---- |
| 25 | 2347 | 1.6* | 0721 | 0.2 | 1223 | 0.6 | 1745 | 0.2 |
| 26 | 0039 | 1.6 | 0753 | 0.1 | 1304 | 0.8 | 1842 | 0.2 |
| 27 | 0119 | 1.6 | 0822 | 0.1 | 1347 | 0.9 | 1929 | 0.1 |
| 28 | 0153 | 1.6 | 0846 | 0.0 | 1419 | 1.0 | 2015 | 0.1 |
| 29 | 0225 | 1.5 | 0908 | 0.0 | 1451 | 1.2 | 2054 | 0.1 |
| 30 | 0256 | 1.4 | 0930 | 0.0 | 1523 | 1.3 | 2134 | 0.1 |
| 31 | 0325 | 1.3 | 0951 | 0.0 | 1555 | 1.3 | 2213 | 0.2 |

* -- TIDE OCCURS ON PREVIOUS DATE.

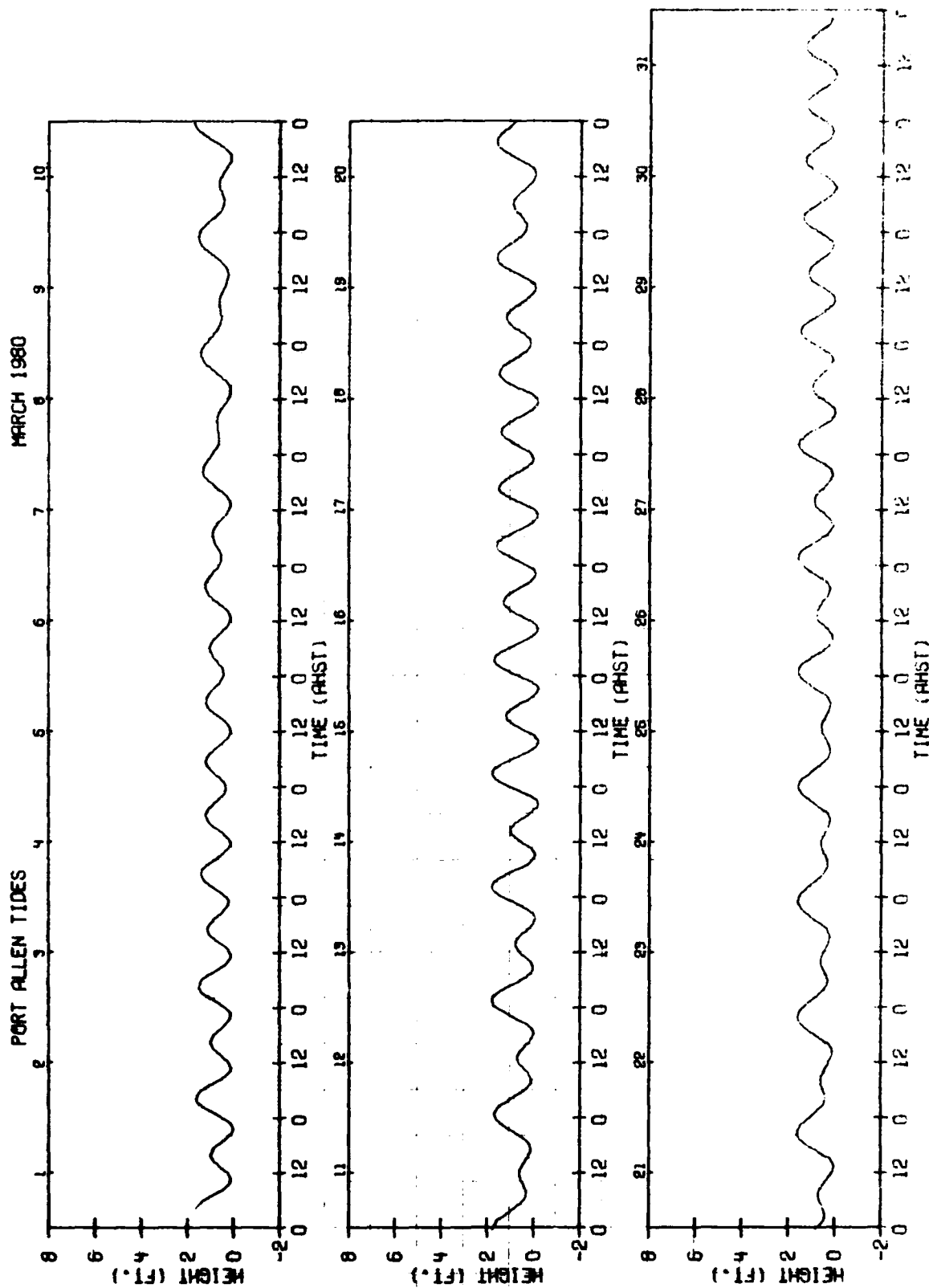


Figure 15. Tidal Graph for Port Allen, March 1980.

TABLE 32
PORT ALLEN TIDES APRIL 1980
21 DEG 54 MIN N 159 DEG 35 MIN W - HANAPEPE BAY

| DATE | TIME AHST | HGT FT | TIME AHST | HGT FT | TIME AHST | HGT FT | TIME AHST | HGT FT |
|------|--------------|-----------|--------------|-----------|--------------|-----------|--------------|-----------|
| 1 | 0351 | 1.2 | 1011 | 0.0 | 1627 | 1.4 | 2254 | 0.2 |
| 2 | 0418 | 1.1 | 1036 | 0.0 | 1702 | 1.5 | ---- | ---- |
| 3 | 2340 | 0.3* | 0450 | 0.9 | 1100 | 0.0 | 1741 | 1.5 |
| 4 | 0033 | 0.3 | 0522 | 0.8 | 1127 | 0.1 | 1825 | 1.5 |
| 5 | 0139 | 0.4 | 0604 | 0.6 | 1202 | 0.1 | 1922 | 1.5 |
| 6 | 0304 | 0.4 | 0707 | 0.6 | 1248 | 0.2 | 2027 | 1.5 |
| 7 | 0431 | 0.3 | 0840 | 0.6 | 1357 | 0.2 | 2140 | 1.6 |
| 8 | 0538 | 0.2 | 1027 | 0.6 | 1530 | 0.3 | 2245 | 1.6 |
| 9 | 0623 | 0.1 | 1141 | 0.7 | 1656 | 0.2 | ---- | ---- |
| 10 | 2346 | 1.7* | 0704 | 0.0 | 1236 | 0.9 | 1812 | 0.2 |
| 11 | 0038 | 1.7 | 0736 | -0.1 | 1321 | 1.1 | 1914 | 0.1 |
| 12 | 0124 | 1.6 | 0811 | -0.2 | 1407 | 1.3 | 2013 | 0.0 |
| 13 | 0209 | 1.6 | 0843 | -0.2 | 1449 | 1.5 | 2109 | 0.0 |
| 14 | 0251 | 1.4 | 0916 | -0.3 | 1535 | 1.7 | 2204 | 0.0 |
| 15 | 0333 | 1.2 | 0948 | -0.3 | 1617 | 1.7 | 2259 | 0.0 |
| 16 | 0415 | 1.0 | 1020 | -0.2 | 1702 | 1.8 | ---- | ---- |
| 17 | 2358 | 0.1* | 0457 | 0.8 | 1055 | -0.2 | 1750 | 1.8 |
| 18 | 0107 | 0.2 | 0544 | 0.6 | 1132 | -0.1 | 1843 | 1.7 |
| 19 | 0221 | 0.2 | 0641 | 0.6 | 1214 | 0.1 | 1941 | 1.7 |
| 20 | 0339 | 0.2 | 0803 | 0.5 | 1306 | 0.2 | 2046 | 1.6 |
| 21 | 0453 | 0.2 | 0946 | 0.6 | 1417 | 0.3 | 2152 | 1.5 |
| 22 | 0547 | 0.2 | 1112 | 0.6 | 1554 | 0.4 | 2254 | 1.5 |
| 23 | 0629 | 0.1 | 1208 | 0.7 | 1719 | 0.4 | ---- | ---- |
| 24 | 2346 | 1.4* | 0657 | 0.1 | 1250 | 0.9 | 1826 | 0.4 |
| 25 | 0031 | 1.4 | 0726 | 0.0 | 1328 | 1.1 | 1921 | 0.3 |
| 26 | 0108 | 1.3 | 0750 | 0.0 | 1402 | 1.3 | 2009 | 0.3 |
| 27 | 0145 | 1.2 | 0814 | -0.1 | 1432 | 1.4 | 2054 | 0.2 |
| 28 | 0217 | 1.1 | 0837 | -0.1 | 1501 | 1.5 | 2136 | 0.2 |
| 29 | 0249 | 1.0 | 0857 | -0.1 | 1533 | 1.6 | 2218 | 0.2 |
| 30 | 0321 | 0.9 | 0921 | -0.1 | 1605 | 1.7 | 2303 | 0.2 |

* -- TIME OCCURS ON PREVIOUS DATE.

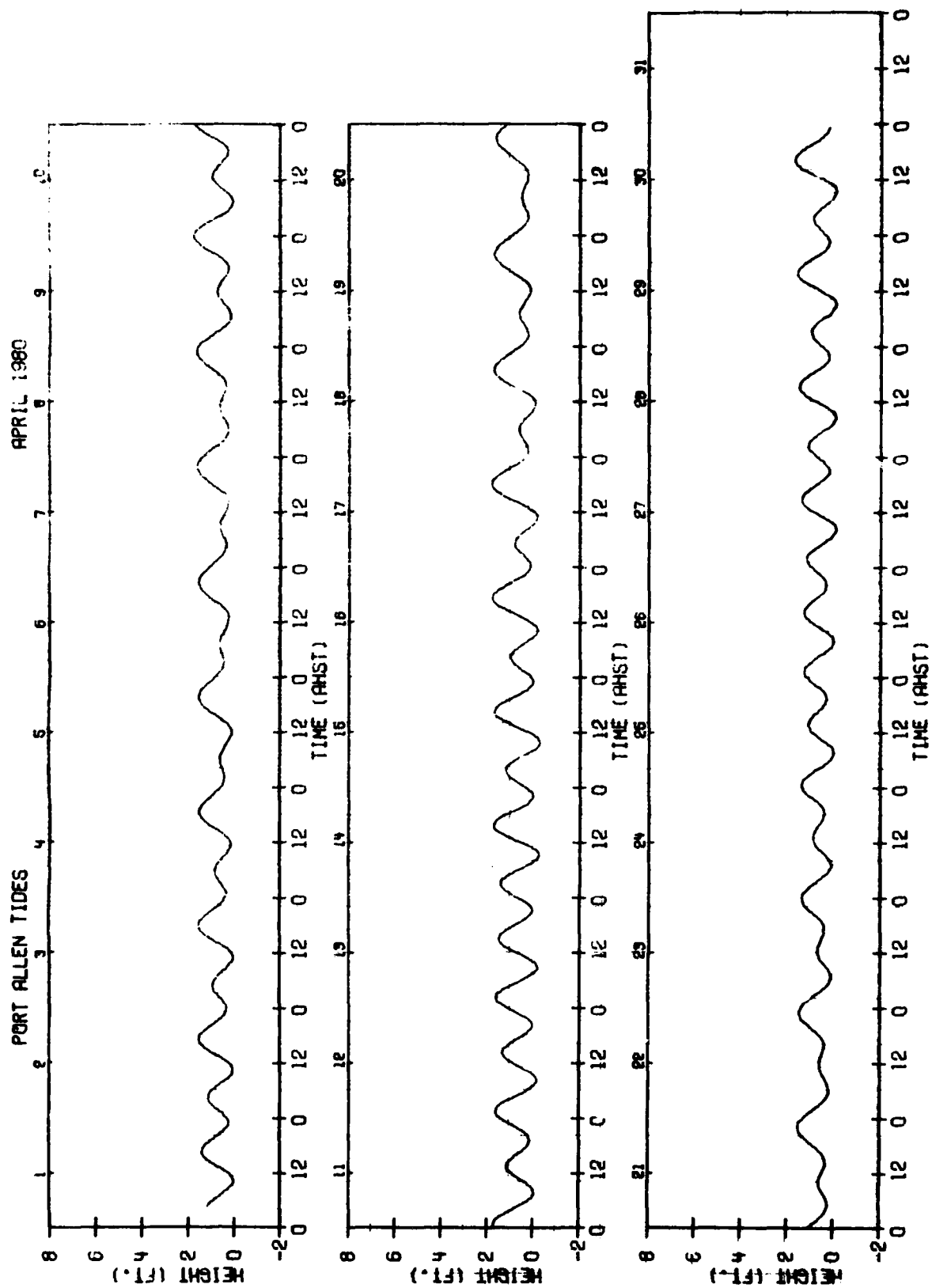


Figure 16. Tidal Graph for Port Allen, April 1980.

TABLE 33

PORT ALLEN TIDES

21 DEG 54 MIN N, 159 DEG 35 MIN W - HANAPEPE RAY

MAY 1980

| DATE | TIME AHST | HGT FT | TIME AHST | HGT FT | TIME AHST | HGT FT | TIME AHST | HGT FT |
|------|--------------|-----------|--------------|-----------|--------------|-----------|--------------|-----------|
| 1 | 0344 | 0.8 | 0446 | -0.1 | 1642 | 1.7 | ---- | --- |
| 2 | 2349 | 0.2* | 0428 | 0.7 | 1010 | 0.0 | 1719 | 1.7 |
| 3 | 0043 | 0.2 | 0510 | 0.6 | 1045 | 0.0 | 1804 | 1.7 |
| 4 | 0144 | 0.2 | 0600 | 0.6 | 1123 | 0.1 | 1853 | 1.7 |
| 5 | 0253 | 0.2 | 0715 | 0.5 | 1215 | 0.2 | 1950 | 1.7 |
| 6 | 0352 | 0.1 | 0852 | 0.5 | 1328 | 0.3 | 2055 | 1.6 |
| 7 | 0450 | 0.1 | 1022 | 0.6 | 1504 | 0.4 | 2158 | 1.6 |
| 8 | 0535 | 0.0 | 1131 | 0.8 | 1640 | 0.4 | 2300 | 1.5 |
| 9 | 0614 | -0.1 | 1228 | 1.1 | 1806 | 0.3 | ---- | --- |
| 10 | 2355 | 1.4* | 0652 | -0.2 | 1310 | 1.4 | 1916 | 0.3 |
| 11 | 0048 | 1.3 | 0726 | -0.3 | 1355 | 1.6 | 2020 | 0.2 |
| 12 | 0137 | 1.2 | 0800 | -0.3 | 1437 | 1.7 | 2119 | 0.1 |
| 13 | 0222 | 1.0 | 0835 | -0.3 | 1519 | 1.9 | 2215 | 0.1 |
| 14 | 0307 | 0.8 | 0907 | -0.3 | 1601 | 2.0 | 2310 | 0.1 |
| 15 | 0354 | 0.7 | 0941 | -0.2 | 1646 | 2.0 | ---- | --- |
| 16 | 0006 | 0.1 | 0438 | 0.6 | 1016 | -0.2 | 1729 | 1.9 |
| 17 | 0104 | 0.1 | 0531 | 0.6 | 1052 | 0.0 | 1814 | 1.8 |
| 18 | 0204 | 0.1 | 0633 | 0.5 | 1133 | 0.1 | 1902 | 1.7 |
| 19 | 0306 | 0.1 | 0752 | 0.5 | 1222 | 0.3 | 1955 | 1.7 |
| 20 | 0358 | 0.1 | 0923 | 0.6 | 1335 | 0.4 | 2052 | 1.5 |
| 21 | 0444 | 0.1 | 1047 | 0.7 | 1508 | 0.5 | 2147 | 1.4 |
| 22 | 0523 | 0.0 | 1142 | 0.9 | 1645 | 0.6 | 2240 | 1.3 |
| 23 | 0556 | 0.0 | 1228 | 1.1 | 1806 | 0.6 | ---- | --- |
| 24 | 2328 | 1.1* | 0628 | 0.0 | 1303 | 1.3 | 1909 | 0.5 |
| 25 | 0017 | 1.0 | 0655 | -0.1 | 1337 | 1.4 | 2006 | 0.4 |
| 26 | 0054 | 0.9 | 0721 | -0.1 | 1410 | 1.6 | 2056 | 0.3 |
| 27 | 0138 | 0.8 | 0748 | -0.1 | 1442 | 1.7 | 2138 | 0.3 |
| 28 | 0214 | 0.8 | 0813 | -0.1 | 1514 | 1.8 | 2223 | 0.2 |
| 29 | 0252 | 0.7 | 0843 | -0.2 | 1549 | 1.9 | 2308 | 0.2 |
| 30 | 0331 | 0.6 | 0912 | -0.1 | 1624 | 1.9 | ---- | --- |
| 31 | 2354 | 0.2* | 0410 | 0.6 | 0944 | -0.1 | 1703 | 1.9 |

* -- TIDE OCCURS ON PREVIOUS DATE.

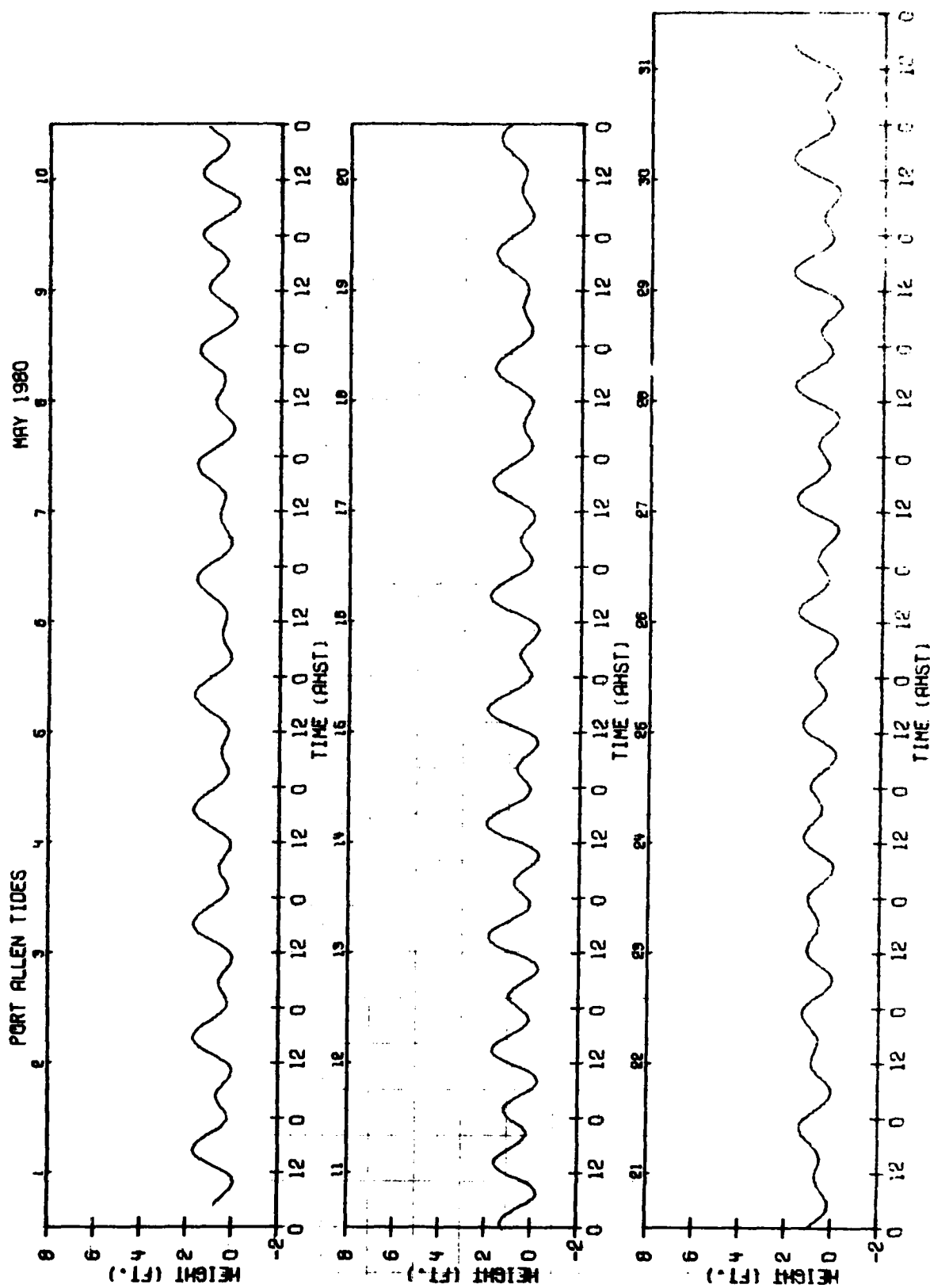


Figure 17. Tidal Graph for Port Allen, May 1980.

TABLE 34
PORT ALLEN TIDES
21 DEG 54 MIN N * 159 DEG 35 MIN W - HANAPPEE BAY JUNE 1980

| DATE | TIME AHST | HGT FT | TIME AHST | HGT FT | TIME AHST | HGT FT | TIME AHST | HGT FT |
|------|--------------|-----------|--------------|-----------|--------------|-----------|--------------|-----------|
| 1 | 0042 | 0.1 | 0459 | 0.6 | 1022 | 0.0 | 1745 | 1.9 |
| 2 | 0132 | 0.1 | 0601 | 0.5 | 1104 | 0.1 | 1830 | 1.8 |
| 3 | 0224 | 0.1 | 0715 | 0.6 | 1200 | 0.2 | 1920 | 1.7 |
| 4 | 0313 | 0.0 | 0841 | 0.6 | 1316 | 0.4 | 2016 | 1.7 |
| 5 | 0401 | -0.1 | 1004 | 0.8 | 1452 | 0.5 | 2115 | 1.5 |
| 6 | 0446 | -0.1 | 1115 | 1.0 | 1635 | 0.6 | 2217 | 1.3 |
| 7 | 0527 | -0.2 | 1208 | 1.3 | 1810 | 0.5 | 2316 | 1.2 |
| 8 | 0607 | -0.3 | 1258 | 1.6 | 1926 | 0.4 | ---- | ---- |
| 9 | 0015 | 1.0 | 0644 | -0.3 | 1343 | 1.8 | 2032 | 0.3 |
| 10 | 0108 | 0.9 | 0724 | -0.3 | 1425 | 2.0 | 2131 | 0.2 |
| 11 | 0201 | 0.7 | 0758 | -0.3 | 1507 | 2.1 | 2223 | 0.1 |
| 12 | 0249 | 0.6 | 0836 | -0.3 | 1546 | 2.1 | 2312 | 0.1 |
| 13 | 0337 | 0.6 | 0912 | -0.2 | 1627 | 2.1 | ---- | ---- |
| 14 | 0001 | 0.1 | 0423 | 0.6 | 0950 | -0.1 | 1708 | 2.0 |
| 15 | 0046 | 0.1 | 0513 | 0.6 | 1026 | 0.0 | 1745 | 1.9 |
| 16 | 0132 | 0.1 | 0611 | 0.6 | 1108 | 0.1 | 1825 | 1.8 |
| 17 | 0217 | 0.1 | 0718 | 0.6 | 1153 | 0.3 | 1907 | 1.7 |
| 18 | 0259 | 0.1 | 0835 | 0.6 | 1256 | 0.5 | 1950 | 1.5 |
| 19 | 0341 | 0.1 | 0954 | 0.8 | 1422 | 0.6 | 2039 | 1.3 |
| 20 | 0416 | 0.1 | 1059 | 1.0 | 1602 | 0.6 | 2130 | 1.2 |
| 21 | 0454 | 0.0 | 1152 | 1.2 | 1739 | 0.6 | 2222 | 1.0 |
| 22 | 0528 | 0.0 | 1234 | 1.4 | 1858 | 0.6 | 2321 | 0.9 |
| 23 | 0602 | 0.0 | 1309 | 1.6 | 1958 | 0.5 | ---- | ---- |
| 24 | 0013 | 0.8 | 0636 | -0.1 | 1344 | 1.7 | 2054 | 0.4 |
| 25 | 0103 | 0.7 | 0708 | -0.1 | 1420 | 1.8 | 2136 | 0.3 |
| 26 | 0148 | 0.6 | 0742 | -0.2 | 1454 | 2.0 | 2218 | 0.2 |
| 27 | 0231 | 0.6 | 0814 | -0.2 | 1530 | 2.1 | 2253 | 0.2 |
| 28 | 0315 | 0.6 | 0853 | -0.2 | 1607 | 2.1 | ---- | ---- |
| 29 | 2335 | 0.1* | 0402 | 0.6 | 0932 | -0.1 | 1644 | 2.1 |
| 30 | 0017 | 0.1 | 0452 | 0.6 | 1014 | 0.0 | 1727 | 2.0 |

* -- TIDE OCCURS ON PREVIOUS DATE.

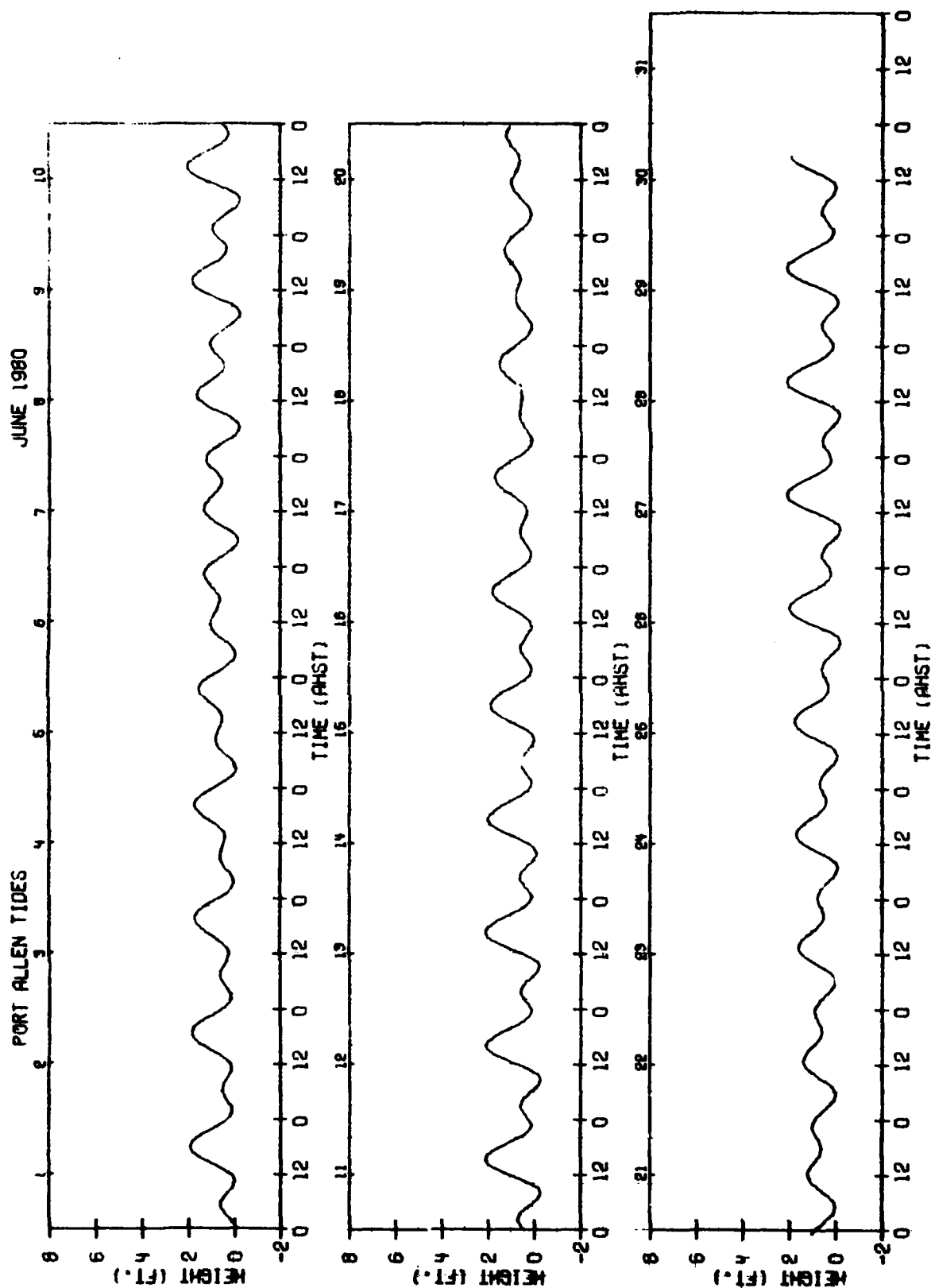


Figure 18. Tidal Graph for Port Allen, June 1980.

TABLE 35
PORT ALLEN TIDES
21 DEG 54 MIN N. 159 DEG 35 MIN W - HANAPEPE BAY JULY 1960

| DATE | TIME AHST | HGT FT | TIME AHST | HGT FT | TIME AHST | HGT FT | TIME AHST | HGT FT |
|------|--------------|-----------|--------------|-----------|--------------|-----------|--------------|-----------|
| 1 | 0059 | 0.1 | 0552 | 0.6 | 1102 | 0.1 | 1809 | 1.9 |
| 2 | 0141 | 0.0 | 0659 | 0.7 | 1201 | 0.3 | 1852 | 1.7 |
| 3 | 0226 | 0.0 | 0816 | 0.8 | 1317 | 0.5 | 1941 | 1.6 |
| 4 | 0312 | -0.1 | 0937 | 1.0 | 1450 | 0.6 | 2036 | 1.4 |
| 5 | 0357 | -0.1 | 1048 | 1.3 | 1642 | 0.6 | 2136 | 1.1 |
| 6 | 0442 | -0.1 | 1150 | 1.6 | 1822 | 0.6 | 2244 | 0.9 |
| 7 | 0529 | -0.2 | 1242 | 1.7 | 1941 | 0.5 | ----- | --- |
| 8 | 2351 | 0.8* | 0612 | -0.2 | 1329 | 1.9 | 2044 | 0.4 |
| 9 | 0052 | 0.7 | 0654 | -0.2 | 1412 | 2.1 | 2136 | 0.3 |
| 10 | 0148 | 0.6 | 0736 | -0.2 | 1452 | 2.1 | 2218 | 0.2 |
| 11 | 0238 | 0.6 | 0818 | -0.2 | 1532 | 2.2 | 2300 | 0.2 |
| 12 | 0323 | 0.6 | 0856 | -0.1 | 1607 | 2.1 | ----- | --- |
| 13 | 2335 | 0.2* | 0407 | 0.6 | 0935 | 0.0 | 1642 | 2.0 |
| 14 | 0010 | 0.2 | 0452 | 0.7 | 1011 | 0.1 | 1718 | 1.9 |
| 15 | 0045 | 0.2 | 0540 | 0.7 | 1052 | 0.2 | 1750 | 1.7 |
| 16 | 0118 | 0.2 | 0633 | 0.8 | 1138 | 0.4 | 1825 | 1.7 |
| 17 | 0152 | 0.2 | 0735 | 0.8 | 1233 | 0.6 | 1901 | 1.5 |
| 18 | 0229 | 0.2 | 0848 | 1.0 | 1344 | 0.6 | 1938 | 1.3 |
| 19 | 0308 | 0.2 | 0957 | 1.1 | 1523 | 0.7 | 2027 | 1.1 |
| 20 | 0348 | 0.2 | 1059 | 1.3 | 1718 | 0.7 | 2123 | 0.9 |
| 21 | 0430 | 0.1 | 1151 | 1.5 | 1847 | 0.6 | 2235 | 0.8 |
| 22 | 0514 | 0.1 | 1237 | 1.7 | 1953 | 0.6 | ----- | --- |
| 23 | 2341 | 0.7* | 0556 | 0.0 | 1317 | 1.8 | 2035 | 0.5 |
| 24 | 0040 | 0.7 | 0635 | 0.0 | 1354 | 2.0 | 2117 | 0.3 |
| 25 | 0129 | 0.7 | 0720 | -0.1 | 1431 | 2.1 | 2152 | 0.3 |
| 26 | 0217 | 0.7 | 0802 | -0.1 | 1509 | 2.2 | 2227 | 0.2 |
| 27 | 0303 | 0.8 | 0844 | -0.1 | 1548 | 2.2 | 2302 | 0.1 |
| 28 | 0351 | 0.8 | 0930 | -0.1 | 1624 | 2.1 | ----- | --- |
| 29 | 2337 | 0.1* | 0439 | 0.9 | 1015 | 0.0 | 1703 | 2.0 |
| 30 | 0017 | 0.1 | 0535 | 1.0 | 1108 | 0.2 | 1742 | 1.8 |
| 31 | 0052 | 0.0 | 0637 | 1.1 | 1210 | 0.4 | 1824 | 1.7 |

* -- TIDE OCCURS ON PREVIOUS DATE.

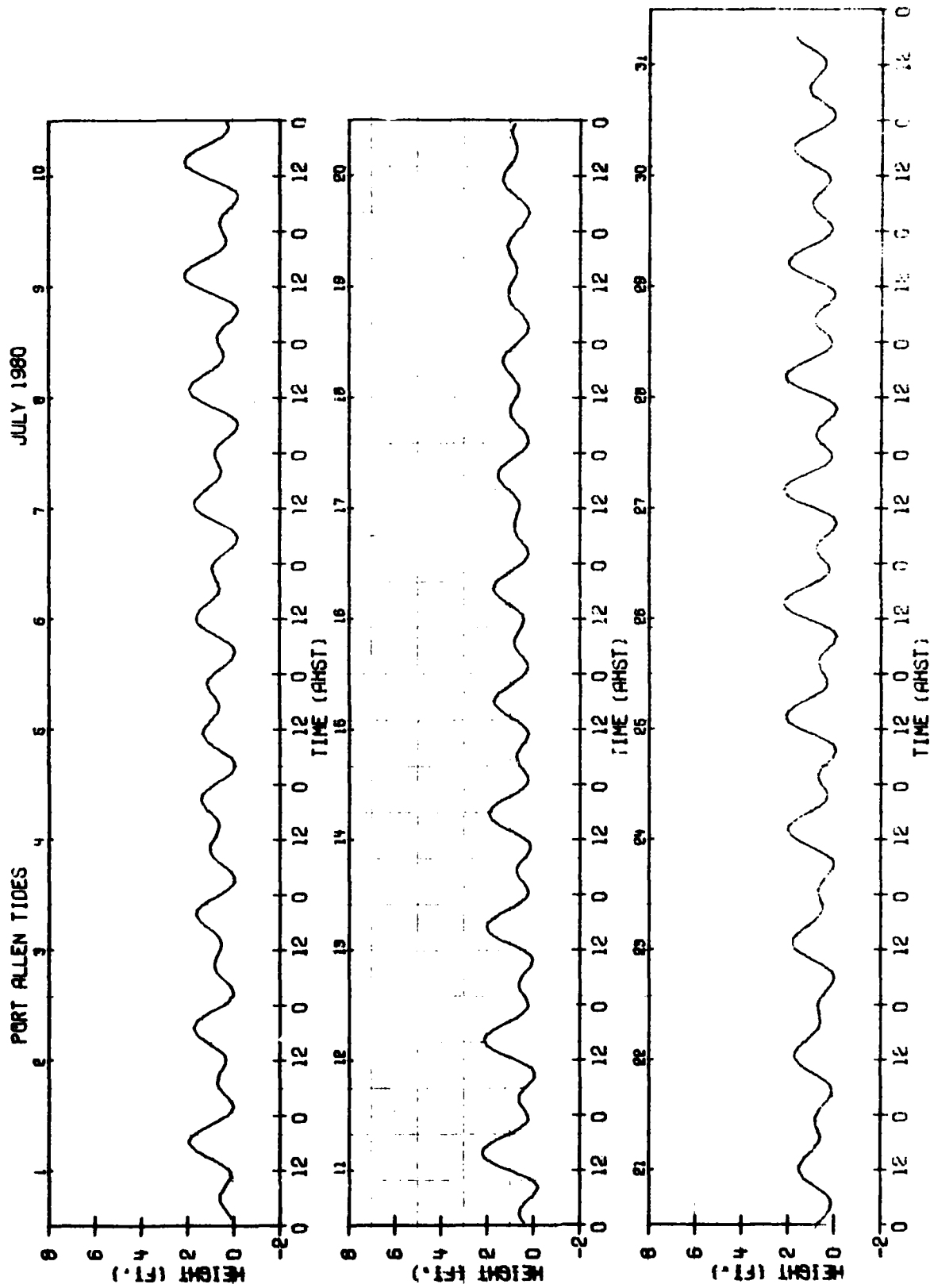


Figure 19. Tidal Graph for Port Allen, July 1980.

TABLE 36

PORT ALLEN TIDES

AUGUST 1940

21 DEG 54 MIN N - 159 DEG 35 MIN W - HANAPPEE BAY

| DATE | TIME AHST | HGT FT | TIME AHST | HGT FT | TIME AHST | HGT FT | TIME AHST | HGT FT |
|------|--------------|-----------|--------------|-----------|--------------|-----------|--------------|-----------|
| 1 | 0134 | 0.0 | 0747 | 1.2 | 1323 | 0.6 | 1911 | 1.5 |
| 2 | 0214 | 0.0 | 0902 | 1.4 | 1501 | 0.6 | 2003 | 1.2 |
| 3 | 0309 | 0.0 | 1019 | 1.6 | 1657 | 0.6 | 2113 | 1.0 |
| 4 | 0403 | 0.0 | 1126 | 1.7 | 1839 | 0.6 | 2232 | 0.8 |
| 5 | 0457 | 0.0 | 1223 | 1.8 | 1949 | 0.5 | ---- | ---- |
| 6 | 2351 | 0.7* | 0550 | 0.0 | 1311 | 2.0 | 2038 | 0.4 |
| 7 | 0055 | 0.7 | 0639 | 0.0 | 1355 | 2.1 | 2120 | 0.3 |
| 8 | 0145 | 0.7 | 0727 | 0.0 | 1434 | 2.1 | 2155 | 0.3 |
| 9 | 0231 | 0.8 | 0809 | 0.0 | 1509 | 2.1 | 2224 | 0.2 |
| 10 | 0310 | 0.9 | 0848 | 0.1 | 1544 | 2.0 | 2253 | 0.2 |
| 11 | 0348 | 0.9 | 0926 | 0.1 | 1613 | 1.9 | 2318 | 0.3 |
| 12 | 0426 | 1.0 | 1005 | 0.2 | 1643 | 1.8 | ---- | ---- |
| 13 | 2346 | 0.3* | 0505 | 1.0 | 1644 | 0.3 | 1713 | 1.7 |
| 14 | 0014 | 0.3 | 0550 | 1.1 | 1729 | 0.5 | 1742 | 1.6 |
| 15 | 0042 | 0.3 | 0643 | 1.1 | 1818 | 0.6 | 1814 | 1.4 |
| 16 | 0114 | 0.3 | 0738 | 1.2 | 1925 | 0.7 | 1849 | 1.2 |
| 17 | 0152 | 0.3 | 0844 | 1.3 | 1502 | 0.7 | 1935 | 1.0 |
| 18 | 0237 | 0.3 | 1000 | 1.4 | 1659 | 0.7 | 2040 | 0.9 |
| 19 | 0329 | 0.3 | 1102 | 1.6 | 1832 | 0.6 | 2213 | 0.8 |
| 20 | 0428 | 0.3 | 1157 | 1.7 | 1926 | 0.6 | ---- | ---- |
| 21 | 2330 | 0.8* | 0522 | 0.2 | 1242 | 1.9 | 2006 | 0.5 |
| 22 | 0031 | 0.8 | 0616 | 0.1 | 1323 | 2.0 | 2041 | 0.3 |
| 23 | 0121 | 0.9 | 0705 | 0.1 | 1402 | 2.1 | 2113 | 0.3 |
| 24 | 0207 | 1.0 | 0754 | 0.0 | 1442 | 2.1 | 2145 | 0.2 |
| 25 | 0250 | 1.1 | 0839 | 0.0 | 1522 | 2.1 | 2217 | 0.1 |
| 26 | 0335 | 1.2 | 0931 | 0.0 | 1557 | 2.0 | 2251 | 0.1 |
| 27 | 0424 | 1.3 | 1020 | 0.1 | 1637 | 1.8 | 2324 | 0.1 |
| 28 | 0516 | 1.4 | 1116 | 0.3 | 1718 | 1.7 | ---- | ---- |
| 29 | 0001 | 0.1 | 0611 | 1.5 | 1219 | 0.5 | 1800 | 1.5 |
| 30 | 0040 | 0.1 | 0714 | 1.6 | 1336 | 0.6 | 1846 | 1.2 |
| 31 | 0125 | 0.2 | 0827 | 1.7 | 1516 | 0.6 | 1948 | 1.0 |

* -- TIDE OCCURS ON PREVIOUS DATE.

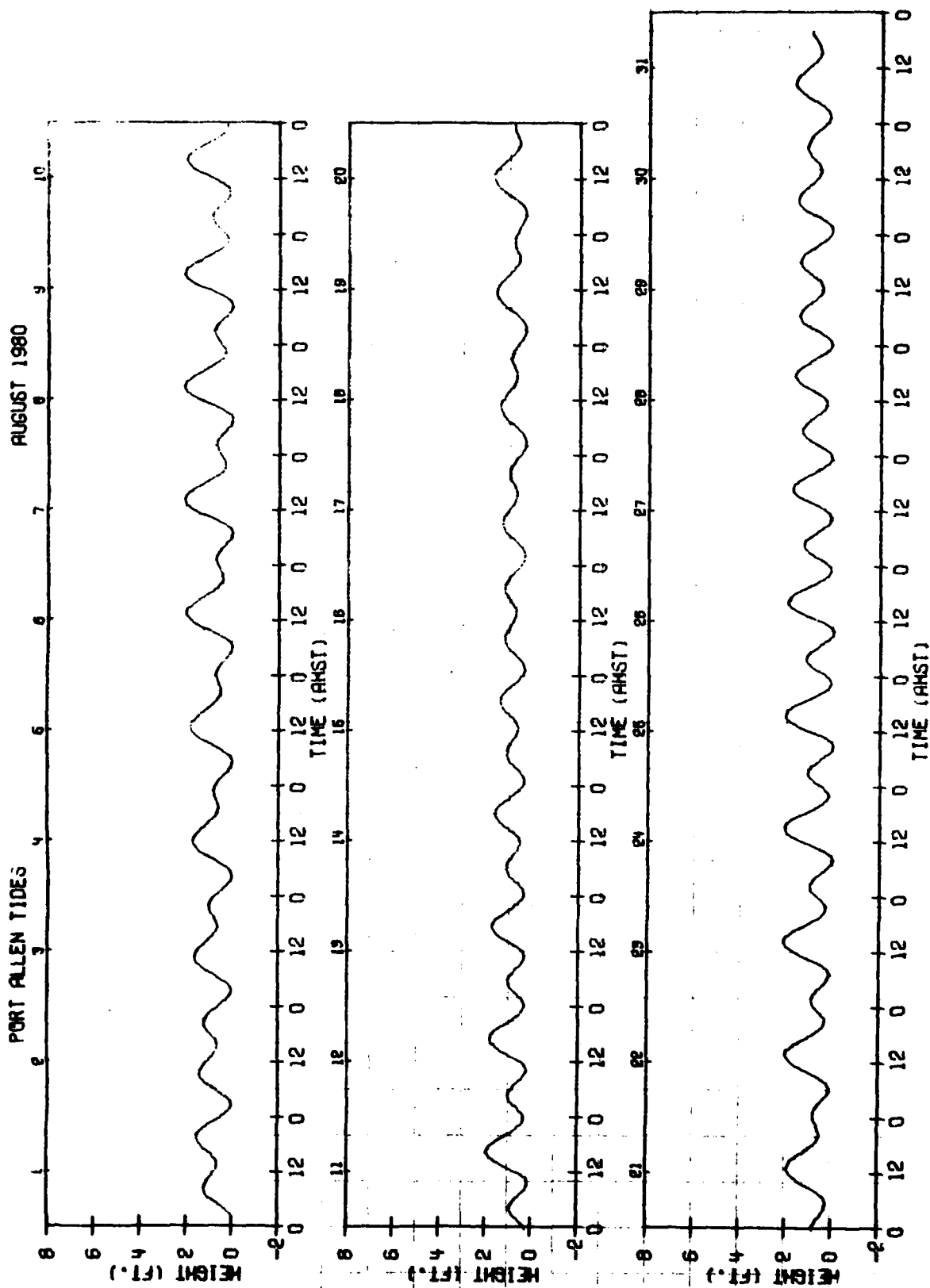


Figure 20. Tidal Graph for Port Allen, August 1980.

TABLE 37

PORT ALLEN TIDES

SEPTEMBER 1940

21 DEG 54 MIN N 159 DEG 35 MIN W - HANAPPEE BAY

| DATE | TIME AHST | HGT FT | TIME AHST | HGT FT | TIME AHST | HGT FT | TIME AHST | HGT FT |
|------|--------------|-----------|--------------|-----------|--------------|-----------|--------------|-----------|
| 1 | 0216 | 0.2 | 0942 | 1.7 | 1709 | 0.6 | 2107 | 0.8 |
| 2 | 0322 | 0.3 | 1054 | 1.8 | 1841 | 0.6 | 2245 | 0.7 |
| 3 | 0424 | 0.3 | 1157 | 1.9 | 1930 | 0.4 | ---- | ---- |
| 4 | 0002 | 0.8 | 0537 | 0.3 | 1244 | 1.9 | 2009 | 0.4 |
| 5 | 0058 | 0.9 | 0629 | 0.2 | 1330 | 2.0 | 2041 | 0.3 |
| 6 | 0143 | 1.0 | 0722 | 0.2 | 1408 | 1.9 | 2110 | 0.3 |
| 7 | 0222 | 1.1 | 0804 | 0.2 | 1440 | 1.9 | 2135 | 0.3 |
| 8 | 0257 | 1.2 | 0846 | 0.2 | 1512 | 1.8 | 2200 | 0.3 |
| 9 | 0324 | 1.3 | 0924 | 0.3 | 1541 | 1.7 | 2222 | 0.3 |
| 10 | 0401 | 1.3 | 1003 | 0.3 | 1609 | 1.7 | 2247 | 0.3 |
| 11 | 0436 | 1.4 | 1042 | 0.4 | 1634 | 1.5 | 2308 | 0.3 |
| 12 | 0515 | 1.4 | 1126 | 0.5 | 1703 | 1.4 | ---- | ---- |
| 13 | 2336 | 0.3* | 0553 | 1.5 | 1717 | 0.6 | 1735 | 1.2 |
| 14 | 0002 | 0.4 | 0645 | 1.5 | 1323 | 0.6 | 1813 | 1.0 |
| 15 | 0035 | 0.4 | 0744 | 1.5 | 1453 | 0.7 | 1902 | 0.9 |
| 16 | 0120 | 0.4 | 0854 | 1.6 | 1640 | 0.6 | 2021 | 0.8 |
| 17 | 0223 | 0.5 | 1006 | 1.7 | 1756 | 0.6 | 2206 | 0.7 |
| 18 | 0335 | 0.4 | 1107 | 1.7 | 1848 | 0.5 | ---- | ---- |
| 19 | 2324 | 0.8* | 0453 | 0.4 | 1200 | 1.8 | 1923 | 0.4 |
| 20 | 0025 | 0.9 | 0600 | 0.3 | 1247 | 1.9 | 1956 | 0.3 |
| 21 | 0113 | 1.1 | 0656 | 0.2 | 1329 | 2.0 | 2027 | 0.2 |
| 22 | 0156 | 1.3 | 0750 | 0.2 | 1411 | 1.9 | 2059 | 0.1 |
| 23 | 0234 | 1.5 | 0841 | 0.1 | 1453 | 1.9 | 2131 | 0.0 |
| 24 | 0322 | 1.6 | 0934 | 0.2 | 1532 | 1.7 | 2202 | 0.0 |
| 25 | 0404 | 1.7 | 1028 | 0.2 | 1611 | 1.6 | 2235 | 0.0 |
| 26 | 0457 | 1.8 | 1126 | 0.3 | 1654 | 1.4 | 2310 | 0.1 |
| 27 | 0546 | 1.8 | 1232 | 0.5 | 1735 | 1.1 | ---- | ---- |
| 28 | 2344 | 0.1* | 0645 | 1.8 | 1351 | 0.5 | 1830 | 0.9 |
| 29 | 0032 | 0.2 | 0748 | 1.8 | 1524 | 0.6 | 1939 | 0.8 |
| 30 | 0125 | 0.3 | 0902 | 1.8 | 1700 | 0.5 | 2124 | 0.7 |

* -- TIDE OCCURS ON PREVIOUS DATE.

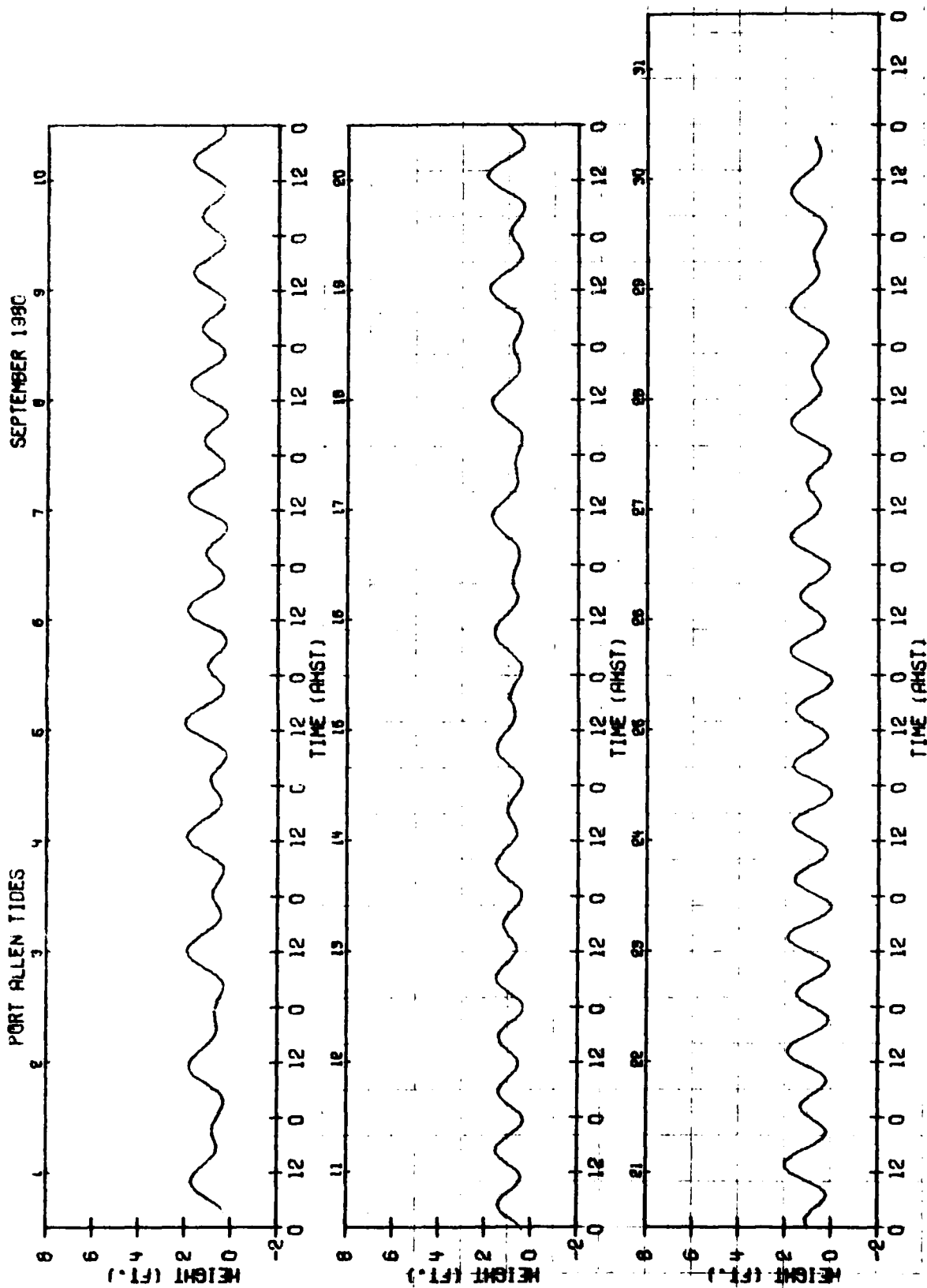


Figure 21. Tidal Graph for Port Allen, September 1980.

TABLE 38
PORT ALLEN TIDES
21 DEG 54 MIN N 159 DEG 35 MIN W - HANAPPEE HAY

OCTOBER 1980

| DATE | TIME AMST | HGT FT | TIME AMST | HGT FT | TIME AMST | HGT FT | TIME AMST | HGT FT |
|------|--------------|-----------|--------------|-----------|--------------|-----------|--------------|-----------|
| 1 | 0237 | 0.4 | 1013 | 1.8 | 1806 | 0.4 | 2301 | 0.8 |
| 2 | 0359 | 0.5 | 1117 | 1.8 | 1855 | 0.4 | ---- | --- |
| 3 | 0007 | 0.9 | 0522 | 0.5 | 1210 | 1.8 | 1929 | 0.3 |
| 4 | 0055 | 1.0 | 0623 | 0.4 | 1255 | 1.7 | 1956 | 0.3 |
| 5 | 0133 | 1.2 | 0716 | 0.4 | 1333 | 1.7 | 2022 | 0.2 |
| 6 | 0206 | 1.3 | 0802 | 0.4 | 1405 | 1.7 | 2046 | 0.2 |
| 7 | 0238 | 1.5 | 0844 | 0.4 | 1437 | 1.6 | 2107 | 0.2 |
| 8 | 0309 | 1.6 | 0924 | 0.4 | 1506 | 1.5 | 2128 | 0.2 |
| 9 | 0341 | 1.7 | 1004 | 0.4 | 1533 | 1.4 | 2150 | 0.2 |
| 10 | 0410 | 1.7 | 1046 | 0.5 | 1602 | 1.2 | 2212 | 0.2 |
| 11 | 0446 | 1.7 | 1129 | 0.5 | 1631 | 1.1 | 2236 | 0.3 |
| 12 | 0521 | 1.7 | 1222 | 0.6 | 1702 | 0.9 | 2303 | 0.3 |
| 13 | 0606 | 1.7 | 1328 | 0.6 | 1748 | 0.8 | 2334 | 0.4 |
| 14 | 0659 | 1.7 | 1445 | 0.6 | 1843 | 0.7 | ---- | --- |
| 15 | 0014 | 0.4 | 0800 | 1.7 | 1608 | 0.5 | 2025 | 0.7 |
| 16 | 0120 | 0.5 | 0908 | 1.7 | 1717 | 0.4 | 2208 | 0.7 |
| 17 | 0253 | 0.6 | 1016 | 1.7 | 1759 | 0.3 | ---- | --- |
| 18 | 2322 | 0.9* | 0429 | 0.5 | 1114 | 1.7 | 1836 | 0.2 |
| 19 | 0015 | 1.1 | 0545 | 0.5 | 1205 | 1.7 | 1908 | 0.1 |
| 20 | 0101 | 1.3 | 0651 | 0.4 | 1253 | 1.7 | 1941 | 0.0 |
| 21 | 0143 | 1.6 | 0750 | 0.3 | 1339 | 1.7 | 2013 | 0.0 |
| 22 | 0226 | 1.7 | 0845 | 0.2 | 1422 | 1.6 | 2045 | -0.1 |
| 23 | 0308 | 1.9 | 0942 | 0.2 | 1506 | 1.4 | 2118 | -0.1 |
| 24 | 0353 | 2.0 | 1039 | 0.2 | 1548 | 1.2 | 2153 | -0.1 |
| 25 | 0439 | 2.1 | 1137 | 0.3 | 1631 | 1.0 | 2229 | 0.0 |
| 26 | 0527 | 2.0 | 1244 | 0.3 | 1719 | 0.8 | 2304 | 0.1 |
| 27 | 0616 | 2.0 | 1355 | 0.4 | 1819 | 0.7 | ---- | --- |
| 28 | 2346 | 0.2* | 0715 | 1.9 | 1512 | 0.4 | 1941 | 0.6 |
| 29 | 0038 | 0.4 | 0816 | 1.8 | 1628 | 0.3 | 2126 | 0.6 |
| 30 | 0147 | 0.5 | 0921 | 1.7 | 1722 | 0.3 | 2259 | 0.8 |
| 31 | 0324 | 0.6 | 1027 | 1.7 | 1804 | 0.2 | ---- | --- |

* -- TIDE OCCURS ON PREVIOUS DATE.

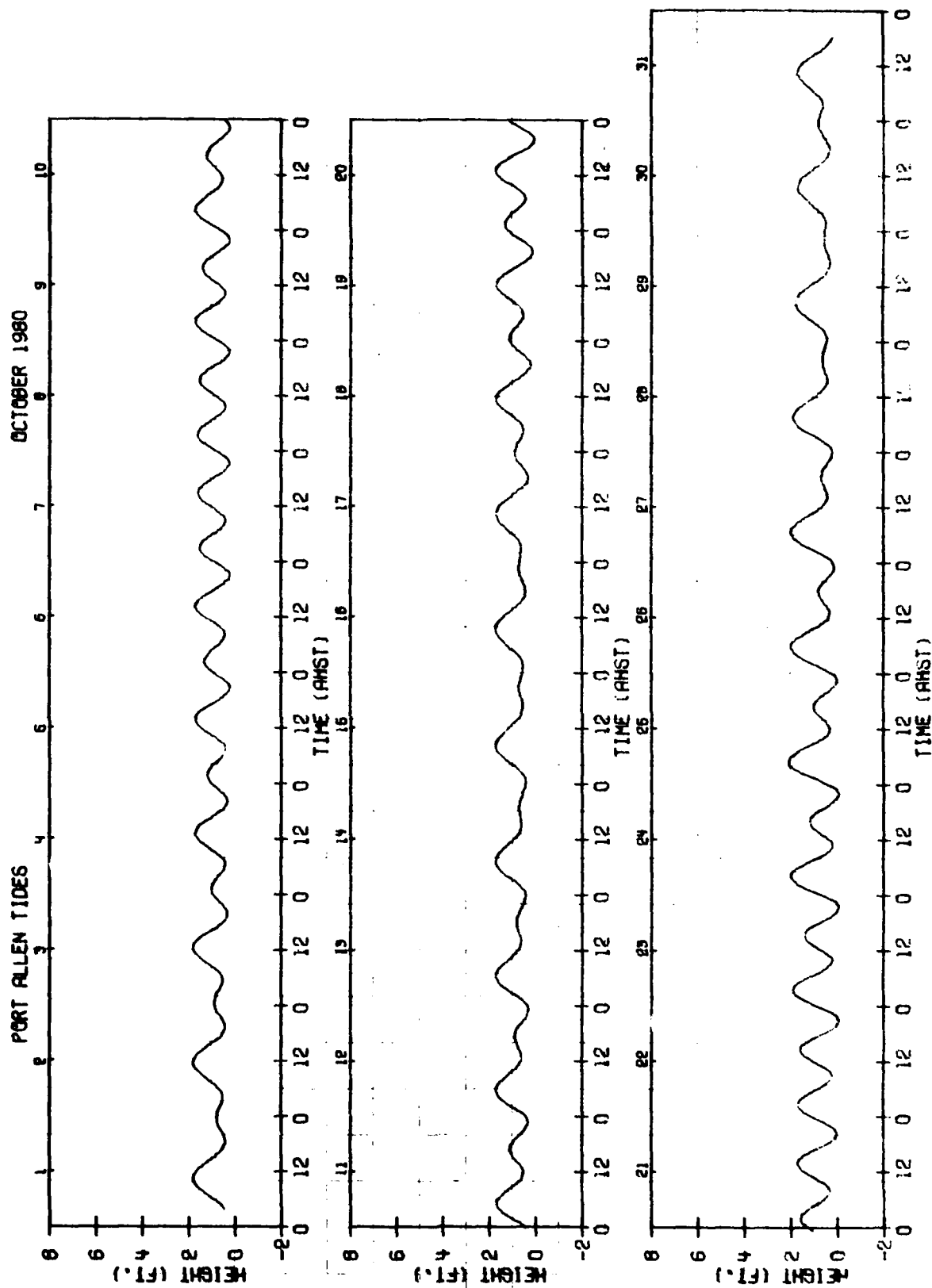


Figure 22. Tidal Graph for Port Allen, October 1980.

TABLE 39

PORT ALLEN TIDES

NOVEMBER 1940

21 DEG 54 MIN N - 154 DEG 35 MIN W - MANAPPEE BAY

| DATE | TIME AHST | HGT FT | TIME AHST | HGT FT | TIME AHST | HGT FT | TIME AHST | HGT FT |
|------|--------------|-----------|--------------|-----------|--------------|-----------|--------------|-----------|
| 1 | 2358 | 1.0* | 0458 | 0.6 | 1120 | 1.6 | 1836 | 0.2 |
| 2 | 0040 | 1.2 | 0612 | 0.6 | 1208 | 1.5 | 1905 | 0.2 |
| 3 | 0119 | 1.3 | 0711 | 0.6 | 1250 | 1.4 | 1929 | 0.1 |
| 4 | 0151 | 1.5 | 0800 | 0.5 | 1325 | 1.3 | 1953 | 0.1 |
| 5 | 0222 | 1.7 | 0845 | 0.5 | 1357 | 1.2 | 2018 | 0.1 |
| 6 | 0251 | 1.7 | 0926 | 0.4 | 1429 | 1.1 | 2041 | 0.1 |
| 7 | 0320 | 1.8 | 1008 | 0.4 | 1501 | 1.0 | 2102 | 0.1 |
| 8 | 0351 | 1.8 | 1051 | 0.4 | 1533 | 0.9 | 2128 | 0.1 |
| 9 | 0423 | 1.9 | 1136 | 0.4 | 1608 | 0.8 | 2153 | 0.1 |
| 10 | 0501 | 1.9 | 1227 | 0.4 | 1647 | 0.7 | 2221 | 0.2 |
| 11 | 0541 | 1.9 | 1323 | 0.4 | 1732 | 0.6 | 2253 | 0.2 |
| 12 | 0627 | 1.8 | 1426 | 0.4 | 1843 | 0.6 | --- | --- |
| 13 | 2337 | 0.3* | 0720 | 1.8 | 1528 | 0.3 | 2019 | 0.6 |
| 14 | 0044 | 0.5 | 0819 | 1.7 | 1621 | 0.2 | 2158 | 0.7 |
| 15 | 0217 | 0.6 | 0921 | 1.7 | 1706 | 0.1 | 2309 | 0.9 |
| 16 | 0407 | 0.6 | 1026 | 1.6 | 1746 | 0.0 | --- | --- |
| 17 | 0601 | 1.2 | 0538 | 0.6 | 1122 | 1.5 | 1823 | -0.1 |
| 18 | 0049 | 1.5 | 0652 | 0.5 | 1215 | 1.4 | 1857 | -0.1 |
| 19 | 0132 | 1.7 | 0756 | 0.4 | 1308 | 1.3 | 1932 | -0.2 |
| 20 | 0214 | 1.9 | 0856 | 0.3 | 1355 | 1.1 | 2007 | -0.2 |
| 21 | 0256 | 2.1 | 0952 | 0.2 | 1441 | 1.0 | 2043 | -0.2 |
| 22 | 0338 | 2.2 | 1047 | 0.2 | 1526 | 0.8 | 2118 | -0.2 |
| 23 | 0423 | 2.2 | 1143 | 0.2 | 1615 | 0.7 | 2154 | -0.1 |
| 24 | 0505 | 2.2 | 1242 | 0.2 | 1704 | 0.6 | 2231 | 0.0 |
| 25 | 0550 | 2.1 | 1341 | 0.2 | 1806 | 0.6 | 2311 | 0.2 |
| 26 | 0638 | 1.9 | 1440 | 0.2 | 1924 | 0.6 | --- | --- |
| 27 | 0002 | 0.3 | 0731 | 1.8 | 1535 | 0.2 | 2057 | 0.6 |
| 28 | 0102 | 0.5 | 0824 | 1.7 | 1624 | 0.2 | 2227 | 0.8 |
| 29 | 0241 | 0.6 | 0921 | 1.5 | 1706 | 0.1 | --- | --- |
| 30 | 2329 | 1.0* | 0424 | 0.6 | 1016 | 1.4 | 1741 | 0.1 |

* -- TIDE OCCURS ON PREVIOUS DATE.

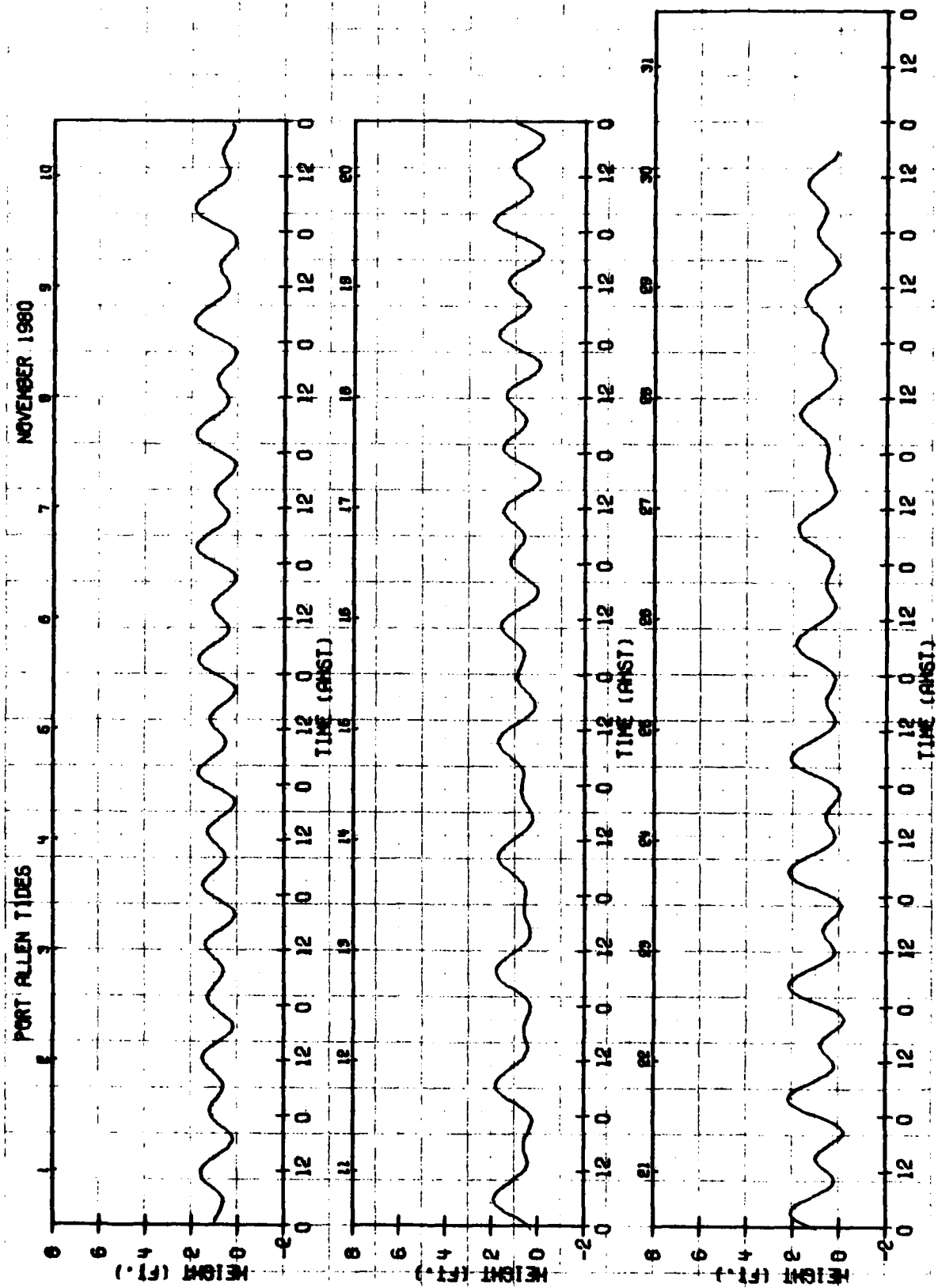


Figure 23. Tidal Graph for Port Allen, November 1980.

TABLE 40
PORT ALLEN TIDES
21 DEG 54 MIN N 159 DEG 35 MIN W - HANAPPE RAY
DECEMBER 1940

| DATE | TIME AHST | HGT FT | TIME AHST | HGT FT | TIME AHST | HGT FT | TIME AHST | HGT FT |
|------|--------------|-----------|--------------|-----------|--------------|-----------|--------------|-----------|
| 1 | 0018 | 1.2 | 0556 | 0.6 | 1109 | 1.2 | 1810 | 0.1 |
| 2 | 0052 | 1.4 | 0705 | 0.6 | 1157 | 1.1 | 1839 | 0.0 |
| 3 | 0127 | 1.6 | 0759 | 0.6 | 1239 | 1.0 | 1908 | 0.0 |
| 4 | 0200 | 1.7 | 0846 | 0.5 | 1321 | 0.9 | 1934 | 0.0 |
| 5 | 0232 | 1.8 | 0933 | 0.4 | 1400 | 0.8 | 2002 | -0.1 |
| 6 | 0304 | 1.9 | 1013 | 0.3 | 1439 | 0.8 | 2027 | -0.1 |
| 7 | 0336 | 2.0 | 1054 | 0.3 | 1514 | 0.7 | 2056 | -0.1 |
| 8 | 0408 | 2.0 | 1136 | 0.3 | 1553 | 0.6 | 2128 | 0.0 |
| 9 | 0444 | 2.0 | 1219 | 0.2 | 1635 | 0.6 | 2200 | 0.0 |
| 10 | 0521 | 2.0 | 1302 | 0.2 | 1727 | 0.6 | 2241 | 0.1 |
| 11 | 0603 | 1.9 | 1350 | 0.2 | 1835 | 0.6 | 2330 | 0.3 |
| 12 | 0649 | 1.8 | 1439 | 0.1 | 1958 | 0.6 | ---- | --- |
| 13 | 0032 | 0.4 | 0739 | 1.7 | 1528 | 0.1 | 2127 | 0.8 |
| 14 | 0202 | 0.6 | 0835 | 1.6 | 1613 | 0.0 | 2243 | 1.0 |
| 15 | 0355 | 0.6 | 0934 | 1.4 | 1656 | -0.1 | ---- | --- |
| 16 | 2342 | 1.3* | 0538 | 0.6 | 1040 | 1.2 | 1738 | -0.2 |
| 17 | 0034 | 1.6 | 0703 | 0.5 | 1143 | 1.0 | 1818 | -0.2 |
| 18 | 0114 | 1.8 | 0809 | 0.4 | 1241 | 0.9 | 1857 | -0.3 |
| 19 | 0202 | 2.0 | 0908 | 0.3 | 1337 | 0.8 | 1938 | -0.3 |
| 20 | 0244 | 2.2 | 1000 | 0.2 | 1425 | 0.7 | 2017 | -0.3 |
| 21 | 0326 | 2.3 | 1049 | 0.1 | 1515 | 0.6 | 2055 | -0.2 |
| 22 | 0407 | 2.2 | 1137 | 0.1 | 1603 | 0.6 | 2134 | -0.2 |
| 23 | 0447 | 2.2 | 1220 | 0.1 | 1651 | 0.6 | 2213 | 0.0 |
| 24 | 0526 | 2.0 | 1305 | 0.1 | 1745 | 0.6 | 2255 | 0.1 |
| 25 | 0607 | 1.9 | 1347 | 0.1 | 1849 | 0.6 | ---- | --- |
| 26 | 2340 | 0.3* | 0647 | 1.7 | 1431 | 0.1 | 2001 | 0.7 |
| 27 | 0032 | 0.5 | 0729 | 1.6 | 1513 | 0.1 | 2127 | 0.8 |
| 28 | 0152 | 0.6 | 0815 | 1.4 | 1553 | 0.1 | 2240 | 1.0 |
| 29 | 0339 | 0.7 | 0904 | 1.2 | 1634 | 0.1 | ---- | --- |
| 30 | 2335 | 1.2* | 0530 | 0.7 | 1002 | 1.0 | 1712 | 0.0 |
| 31 | 0021 | 1.4 | 0655 | 0.6 | 1101 | 0.9 | 1747 | 0.0 |

* -- TIDE OCCURS ON PREVIOUS DATE.

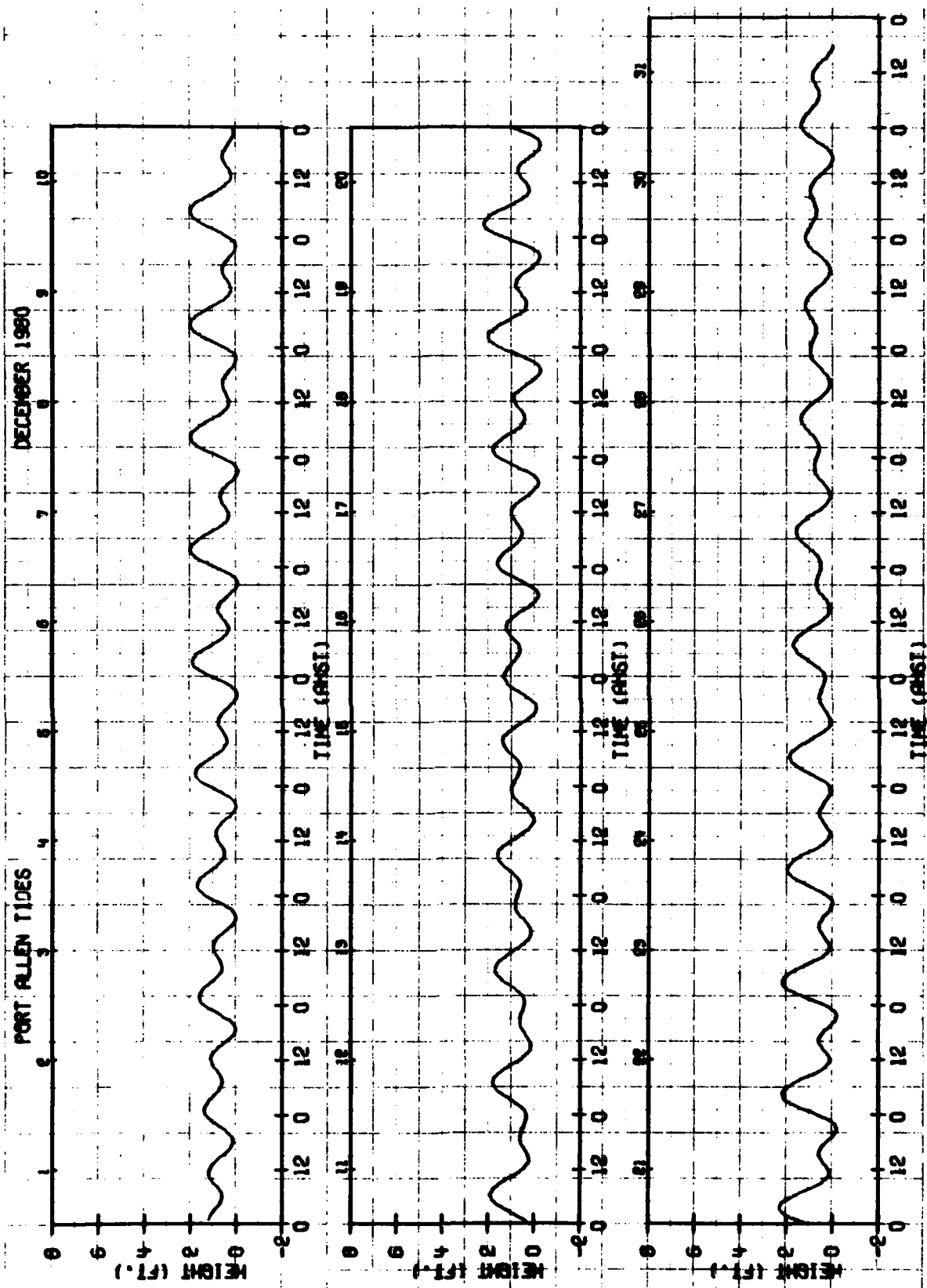


Figure 24. Tidal Graph for Port Allen, December 1980.

APPENDIX A

HEIGHT OF THE TIDE AT ANY TIME*

The height of the tide at times intermediate to the times of high and low water is needed on occasion, and may be computed by either numerical or graphical methods. One example of each method is presented here, using the predicted tides for a day at Point Mugu.

Problem: Given that the predicted times and heights of the tides are:

| Time | Height | Time | Height | Time | Height | Time | Height |
|------|--------|------|--------|------|--------|------|--------|
| 0039 | 4.9 | 0814 | 0.2 | 1510 | 3.1 | 1933 | 2.4 |

Find the height of the tide at 0300.

Numerical Method

The duration of fall is $08^h 14^m - 00^h 39^m = 7^h 35^m$.

The time after high water for which the height is required is $03^h 00^m - 00^h 39^m = 02^h 21^m$.

The range of tide is $4.9 - 0.2 = 4.7$ feet.

Entering table A-1 at the duration of fall of $7^h 40^m$, which is the nearest value to $7^h 35^m$, the nearest value on the horizontal line to $2^h 21^m$ is $2^h 18^m$ after high water. Following down this column to its intersection with a range of 4.5 feet which is the nearest tabular value to 4.7 feet, one obtains 0.9 which, being calculated from high water, must be subtracted from it. The approximate height at $03^h 00^m$ is, therefore, $4.9 - 0.9 = 4.0$ feet.

When the duration of rise or fall is greater than $10^h 40^m$, enter the table with one-half the given duration and with one-half the time from the nearest high or low water; but if the duration of rise or fall is less than 4 hours, enter the table with double the given duration and with double the time from the nearest high or low water.

*This information is adapted from table 3 of the data source for this publication (see page 1).

Table A-1. Height of the Tide at Any Time

| | | Time from the nearest high water or low water | | | | | | | | | | | | | | | |
|---|-------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | A. m. | A. m. | A. m. | A. m. | A. m. | A. m. | A. m. | A. m. | A. m. | A. m. | A. m. | A. m. | A. m. | A. m. | A. m. | A. m. |
| Duration of rise or fall, see footnote. | 4 00 | 0 08 | 0 16 | 0 24 | 0 32 | 0 40 | 0 48 | 0 56 | 1 04 | 1 12 | 1 20 | 1 28 | 1 36 | 1 44 | 1 52 | 2 00 | |
| | 4 20 | 0 09 | 0 17 | 0 26 | 0 35 | 0 43 | 0 52 | 1 01 | 1 09 | 1 18 | 1 27 | 1 35 | 1 44 | 1 53 | 2 01 | 2 10 | |
| | 4 40 | 0 09 | 0 19 | 0 28 | 0 37 | 0 47 | 0 56 | 1 05 | 1 15 | 1 24 | 1 33 | 1 43 | 1 52 | 2 01 | 2 11 | 2 20 | |
| | 5 00 | 0 10 | 0 20 | 0 30 | 0 40 | 0 50 | 1 00 | 1 10 | 1 20 | 1 30 | 1 40 | 1 50 | 2 00 | 2 10 | 2 20 | 2 30 | |
| | 5 20 | 0 11 | 0 21 | 0 32 | 0 43 | 0 53 | 1 04 | 1 15 | 1 25 | 1 36 | 1 47 | 1 57 | 2 08 | 2 19 | 2 29 | 2 40 | |
| | 5 40 | 0 11 | 0 23 | 0 34 | 0 45 | 0 57 | 1 08 | 1 19 | 1 31 | 1 42 | 1 53 | 2 05 | 2 16 | 2 27 | 2 39 | 2 50 | |
| | 6 00 | 0 12 | 0 24 | 0 36 | 0 48 | 1 00 | 1 12 | 1 24 | 1 36 | 1 48 | 2 00 | 2 12 | 2 24 | 2 36 | 2 48 | 3 00 | |
| | 6 20 | 0 13 | 0 25 | 0 38 | 0 51 | 1 03 | 1 16 | 1 29 | 1 41 | 1 54 | 2 07 | 2 19 | 2 32 | 2 45 | 2 57 | 3 10 | |
| | 6 40 | 0 13 | 0 27 | 0 40 | 0 53 | 1 07 | 1 20 | 1 33 | 1 47 | 2 00 | 2 13 | 2 27 | 2 40 | 2 53 | 3 07 | 3 20 | |
| | 7 00 | 0 14 | 0 28 | 0 42 | 0 56 | 1 10 | 1 24 | 1 38 | 1 52 | 2 06 | 2 20 | 2 34 | 2 48 | 3 02 | 3 16 | 3 30 | |
| | 7 20 | 0 15 | 0 29 | 0 44 | 0 59 | 1 13 | 1 28 | 1 43 | 1 57 | 2 12 | 2 27 | 2 41 | 2 56 | 3 11 | 3 25 | 3 40 | |
| | 7 40 | 0 15 | 0 31 | 0 46 | 1 01 | 1 17 | 1 32 | 1 47 | 2 03 | 2 18 | 2 33 | 2 49 | 3 04 | 3 19 | 3 35 | 3 50 | |
| | 8 00 | 0 16 | 0 32 | 0 48 | 1 04 | 1 20 | 1 36 | 1 52 | 2 08 | 2 24 | 2 40 | 2 56 | 3 12 | 3 28 | 3 44 | 4 00 | |
| | 8 20 | 0 17 | 0 33 | 0 50 | 1 07 | 1 23 | 1 40 | 1 57 | 2 13 | 2 30 | 2 47 | 3 03 | 3 20 | 3 37 | 3 53 | 4 10 | |
| | 8 40 | 0 17 | 0 35 | 0 52 | 1 09 | 1 27 | 1 44 | 2 01 | 2 19 | 2 36 | 2 53 | 3 11 | 3 28 | 3 45 | 4 03 | 4 20 | |
| | 9 00 | 0 18 | 0 36 | 0 54 | 1 12 | 1 30 | 1 48 | 2 06 | 2 24 | 2 42 | 3 00 | 3 18 | 3 36 | 3 54 | 4 12 | 4 30 | |
| | 9 20 | 0 19 | 0 37 | 0 56 | 1 15 | 1 33 | 1 52 | 2 11 | 2 29 | 2 48 | 3 07 | 3 25 | 3 44 | 4 03 | 4 21 | 4 40 | |
| | 9 40 | 0 19 | 0 39 | 0 58 | 1 17 | 1 37 | 1 56 | 2 15 | 2 35 | 2 54 | 3 13 | 3 33 | 3 52 | 4 11 | 4 31 | 4 50 | |
| | 10 00 | 0 20 | 0 40 | 1 00 | 1 20 | 1 40 | 2 00 | 2 20 | 2 40 | 3 00 | 3 20 | 3 40 | 4 00 | 4 20 | 4 40 | 5 00 | |
| | 10 20 | 0 21 | 0 41 | 1 02 | 1 23 | 1 43 | 2 04 | 2 25 | 2 45 | 3 06 | 3 27 | 3 47 | 4 08 | 4 29 | 4 49 | 5 10 | |
| | 10 40 | 0 21 | 0 43 | 1 04 | 1 25 | 1 47 | 2 08 | 2 29 | 2 51 | 3 12 | 3 33 | 3 55 | 4 16 | 4 37 | 4 59 | 5 20 | |
| | | Correction to height | | | | | | | | | | | | | | | |
| | | Ft. | Ft. | Ft. | Ft. | Ft. | Ft. | Ft. | Ft. | Ft. | Ft. | Ft. | Ft. | Ft. | Ft. | Ft. | Ft. |
| Range of tide, see footnote. | 0.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.5 | 0.5 |
| | 1.5 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.3 | 0.3 | 0.4 | 0.5 | 0.6 | 0.6 | 0.7 | 0.8 |
| | 2.0 | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 | 1.0 |
| | 2.5 | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.9 | 1.0 | 1.1 | 1.2 | 1.2 |
| | 3.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.8 | 0.9 | 1.0 | 1.2 | 1.3 | 1.5 | 1.5 |
| | 3.5 | 0.0 | 0.0 | 0.1 | 0.2 | 0.2 | 0.3 | 0.4 | 0.6 | 0.7 | 0.9 | 1.0 | 1.2 | 1.4 | 1.6 | 1.8 | 1.8 |
| | 4.0 | 0.0 | 0.0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.7 | 0.8 | 1.0 | 1.2 | 1.4 | 1.6 | 1.8 | 2.0 | 2.0 |
| | 4.5 | 0.0 | 0.0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.6 | 0.7 | 0.9 | 1.1 | 1.3 | 1.6 | 1.8 | 2.0 | 2.2 | 2.2 |
| | 5.0 | 0.0 | 0.1 | 0.1 | 0.2 | 0.3 | 0.5 | 0.6 | 0.8 | 1.0 | 1.2 | 1.5 | 1.7 | 2.0 | 2.2 | 2.5 | 2.5 |
| | 5.5 | 0.0 | 0.1 | 0.1 | 0.2 | 0.4 | 0.5 | 0.7 | 0.9 | 1.1 | 1.4 | 1.6 | 1.9 | 2.2 | 2.5 | 2.8 | 2.8 |
| | 6.0 | 0.0 | 0.1 | 0.1 | 0.3 | 0.4 | 0.6 | 0.8 | 1.0 | 1.2 | 1.5 | 1.8 | 2.1 | 2.4 | 2.7 | 3.0 | 3.0 |
| | 6.5 | 0.0 | 0.1 | 0.2 | 0.3 | 0.4 | 0.6 | 0.8 | 1.1 | 1.3 | 1.6 | 1.9 | 2.2 | 2.6 | 2.9 | 3.2 | 3.2 |
| | 7.0 | 0.0 | 0.1 | 0.2 | 0.3 | 0.5 | 0.7 | 0.9 | 1.2 | 1.4 | 1.8 | 2.1 | 2.4 | 2.8 | 3.1 | 3.5 | 3.5 |
| | 7.5 | 0.0 | 0.1 | 0.2 | 0.3 | 0.5 | 0.7 | 1.0 | 1.2 | 1.5 | 1.9 | 2.2 | 2.6 | 3.0 | 3.4 | 3.8 | 3.8 |
| | 8.0 | 0.0 | 0.1 | 0.2 | 0.3 | 0.5 | 0.8 | 1.0 | 1.3 | 1.6 | 2.0 | 2.4 | 2.8 | 3.2 | 3.6 | 4.0 | 4.0 |
| | 8.5 | 0.0 | 0.1 | 0.2 | 0.4 | 0.6 | 0.8 | 1.1 | 1.4 | 1.8 | 2.1 | 2.5 | 2.9 | 3.4 | 3.8 | 4.2 | 4.2 |
| | 9.0 | 0.0 | 0.1 | 0.2 | 0.4 | 0.6 | 0.9 | 1.2 | 1.5 | 1.9 | 2.2 | 2.7 | 3.1 | 3.6 | 4.0 | 4.5 | 4.5 |
| | 9.5 | 0.0 | 0.1 | 0.2 | 0.4 | 0.6 | 0.9 | 1.2 | 1.6 | 2.0 | 2.4 | 2.8 | 3.3 | 3.8 | 4.3 | 4.8 | 4.8 |
| | 10.0 | 0.0 | 0.1 | 0.2 | 0.4 | 0.7 | 1.0 | 1.3 | 1.7 | 2.1 | 2.5 | 3.0 | 3.5 | 4.0 | 4.5 | 5.0 | 5.0 |
| | 10.5 | 0.0 | 0.1 | 0.3 | 0.5 | 0.7 | 1.0 | 1.3 | 1.7 | 2.2 | 2.6 | 3.1 | 3.6 | 4.2 | 4.7 | 5.2 | 5.2 |
| | 11.0 | 0.0 | 0.1 | 0.3 | 0.5 | 0.7 | 1.1 | 1.4 | 1.8 | 2.3 | 2.8 | 3.3 | 3.8 | 4.4 | 4.9 | 5.5 | 5.5 |
| | 11.5 | 0.0 | 0.1 | 0.3 | 0.5 | 0.8 | 1.1 | 1.5 | 1.9 | 2.4 | 2.9 | 3.4 | 4.0 | 4.6 | 5.1 | 5.8 | 5.8 |
| | 12.0 | 0.0 | 0.1 | 0.3 | 0.5 | 0.8 | 1.1 | 1.5 | 2.0 | 2.5 | 3.0 | 3.6 | 4.1 | 4.8 | 5.4 | 6.0 | 6.0 |
| | 12.5 | 0.0 | 0.1 | 0.3 | 0.5 | 0.8 | 1.2 | 1.6 | 2.1 | 2.6 | 3.1 | 3.7 | 4.3 | 5.0 | 5.6 | 6.2 | 6.2 |
| | 13.0 | 0.0 | 0.1 | 0.3 | 0.6 | 0.9 | 1.2 | 1.7 | 2.2 | 2.7 | 3.2 | 3.9 | 4.5 | 5.1 | 5.8 | 6.5 | 6.5 |
| | 13.5 | 0.0 | 0.1 | 0.3 | 0.6 | 0.9 | 1.3 | 1.7 | 2.2 | 2.8 | 3.4 | 4.0 | 4.7 | 5.3 | 6.0 | 6.8 | 6.8 |
| | 14.0 | 0.0 | 0.2 | 0.3 | 0.6 | 0.9 | 1.3 | 1.8 | 2.3 | 2.9 | 3.5 | 4.2 | 4.8 | 5.5 | 6.3 | 7.0 | 7.0 |
| | 14.5 | 0.0 | 0.2 | 0.4 | 0.6 | 1.0 | 1.4 | 1.9 | 2.4 | 3.0 | 3.6 | 4.3 | 5.0 | 5.7 | 6.5 | 7.2 | 7.2 |
| | 15.0 | 0.0 | 0.2 | 0.4 | 0.6 | 1.0 | 1.4 | 1.9 | 2.5 | 3.1 | 3.8 | 4.4 | 5.2 | 5.9 | 6.7 | 7.5 | 7.5 |
| | 15.5 | 0.0 | 0.2 | 0.4 | 0.7 | 1.0 | 1.5 | 2.0 | 2.6 | 3.2 | 3.9 | 4.6 | 5.4 | 6.1 | 6.9 | 7.8 | 7.8 |
| | 16.0 | 0.0 | 0.2 | 0.4 | 0.7 | 1.1 | 1.5 | 2.1 | 2.6 | 3.3 | 4.0 | 4.7 | 5.5 | 6.3 | 7.2 | 8.0 | 8.0 |
| | 16.5 | 0.0 | 0.2 | 0.4 | 0.7 | 1.1 | 1.6 | 2.1 | 2.7 | 3.4 | 4.1 | 4.9 | 5.7 | 6.5 | 7.4 | 8.2 | 8.2 |
| | 17.0 | 0.0 | 0.2 | 0.4 | 0.7 | 1.1 | 1.6 | 2.2 | 2.8 | 3.5 | 4.2 | 5.0 | 5.9 | 6.7 | 7.6 | 8.5 | 8.5 |
| | 17.5 | 0.0 | 0.2 | 0.4 | 0.8 | 1.2 | 1.7 | 2.2 | 2.9 | 3.6 | 4.4 | 5.2 | 6.0 | 6.9 | 7.8 | 8.8 | 8.8 |
| | 18.0 | 0.0 | 0.2 | 0.4 | 0.8 | 1.2 | 1.7 | 2.3 | 3.0 | 3.7 | 4.5 | 5.3 | 6.2 | 7.1 | 8.1 | 9.0 | 9.0 |
| | 18.5 | 0.1 | 0.2 | 0.5 | 0.8 | 1.2 | 1.8 | 2.4 | 3.1 | 3.8 | 4.6 | 5.5 | 6.4 | 7.3 | 8.3 | 9.2 | 9.2 |
| | 19.0 | 0.1 | 0.2 | 0.5 | 0.8 | 1.3 | 1.8 | 2.4 | 3.1 | 3.9 | 4.8 | 5.6 | 6.6 | 7.5 | 8.5 | 9.5 | 9.5 |
| | 19.5 | 0.1 | 0.2 | 0.5 | 0.8 | 1.3 | 1.9 | 2.5 | 3.2 | 4.0 | 4.9 | 5.8 | 6.7 | 7.7 | 8.7 | 9.8 | 9.8 |
| | 20.0 | 0.1 | 0.2 | 0.5 | 0.9 | 1.3 | 1.9 | 2.6 | 3.3 | 4.1 | 5.0 | 5.9 | 6.9 | 7.9 | 9.0 | 10.0 | 10.0 |

Obtain from the predictions the high water and low water, one of which is before and the other after the time for which the height is required. The difference between the times of occurrence of these tides is the duration of rise or fall, and the difference between their heights is the range of tide for the above table. Find the difference between the nearest high or low water and the time for which the height is required.

Enter the table with the duration of rise or fall, printed in heavy-faced type, which most nearly agrees with the actual value, and on that horizontal line find the time from the nearest high or low water which agrees most nearly with the corresponding actual difference. The correction sought is in the column directly below, on the line with the range of tide.

When the nearest tide is high water, subtract the correction.

When the nearest tide is low water, add the correction.

Graphical Method

If the height of the tide is required for a number of times on a certain day the full tide curve for the day may be obtained by the *one-quarter, one-tenth rule*. The procedure is as follows:

1. On cross-section paper plot the high and low water points in the order of their occurrence for the day, measuring time horizontally and height vertically. These are the basic points for the curve.
2. Draw light straight lines connecting the points representing successive high and low waters.
3. Divide each of these straight lines into four equal parts. The halfway point of each line gives another point for the curve.
4. At the quarter point adjacent to high water, draw a vertical line above the point, and at the quarter point adjacent to low water, draw a vertical line below the point, making the length of these lines equal to one-tenth of the range between the high and low waters used. The points marking the ends of these vertical lines give two additional intermediate points for the curve.
5. Draw a smooth curve through the points of high and low waters and the intermediate points, making the curve well rounded near high and low waters. This curve will approximate the actual tide curve and heights for any time of the day may be readily scaled from it. The resulting graph is shown in figure A-1.

CAUTION

Both methods presented are based on the assumption that the rise and fall conform to simple cosine curves. Therefore the heights obtained will be approximate. The roughness of approximation will vary as the tide curve differs from a cosine curve.

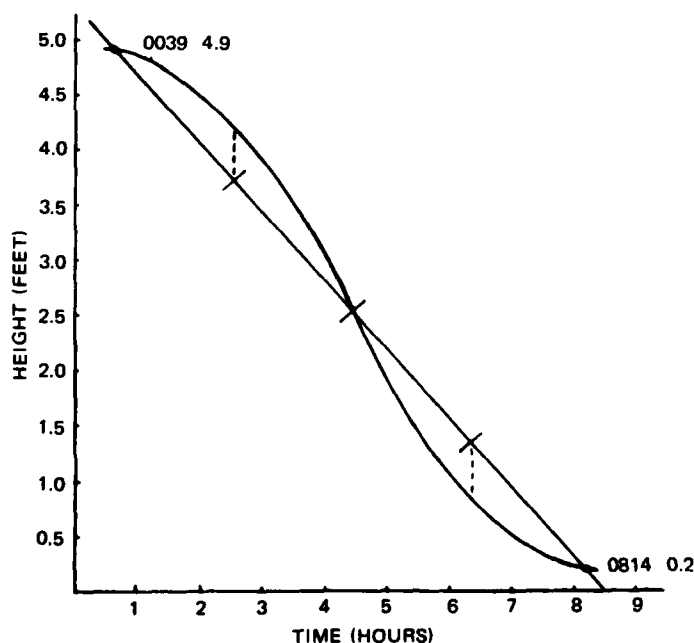


Figure A-1. Tidal Curve for Solution of the Problem.

APPENDIX B

EQUINOXES, SOLSTICES, AND LUNAR PHASES DURING 1980

The dates and times for Vernal and Autumnal Equinoxes and Summer and Winter Solstices during 1980 are listed in table B-1. The 1980 dates and times for phases of the moon are given in table B-2. Both tables have been calculated for Point Mugu and San Nicolas Island. Two hours must be subtracted for times in the Barking Sands area.

Table B-1. Equinoxes and Solstices, 1980, Point Mugu and San Nicolas Island

NOTE: All times are Pacific Standard Time; add 1 hour when Daylight Savings Time (PDT) is in effect. Subtract 2 hours for Barking Sands area.

| | | |
|------------------|------------------------|---|
| Vernal Equinox | 20 March, 0310 PST | Beginning of Spring; day and night of equal length. |
| Summer Solstice | 20 June, 2147 PST | Beginning of Summer; greatest duration of daylight. |
| Autumnal Equinox | 22 September, 1309 PST | Beginning of Autumn; day and night of equal length. |
| Winter Solstice | 21 December, 0856 PST | Beginning of Winter; greatest duration of darkness. |

Table B-2. Lunar Phases, 1980, Point Mugu and San Nicolas Island

NOTE: All times are Pacific Standard Time; add 1 hour when Daylight Savings Time (PDT) is in effect. Subtract 2 hours for times in the Barking Sands area.

| Phase | January | | February | | March | | April | |
|---------------|-----------|------|----------|------|----------|------|----------|------|
| | Date | Time | Date | Time | Date | Time | Date | Time |
| Full Moon | 02 | 0102 | --- | --- | --- | --- | --- | --- |
| Last Quarter | 10 | 0349 | 08 | 2335 | 09 | 1549 | 08 | 0406 |
| New Moon | 17 | 1319 | 16 | 0051 | 16 | 1056 | 14 | 1946 |
| First Quarter | 24 | 0558 | 22 | 1614 | 23 | 0431 | 21 | 1859 |
| Full Moon | 31 | 1821 | 29 | 1300 | 31 | 0714 | 29 | 2335 |
| Phase | May | | June | | July | | August | |
| | Date | Time | Date | Time | Date | Time | Date | Time |
| Last Quarter | 07 | 1251 | 05 | 1853 | 04 | 2327 | 03 | 0400 |
| New Moon | 14 | 0400 | 12 | 1238 | 11 | 2246 | 10 | 1109 |
| First Quarter | 21 | 1116 | 20 | 0432 | 19 | 2151 | 18 | 1428 |
| Full Moon | 29 | 1328 | 28 | 0102 | 27 | 1054 | 25 | 1942 |
| Phase | September | | October | | November | | December | |
| | Date | Time | Date | Time | Date | Time | Date | Time |
| Last Quarter | 01 | 1008 | --- | --- | --- | --- | --- | --- |
| New Moon | 09 | 0200 | 08 | 1850 | 07 | 1243 | 07 | 0635 |
| First Quarter | 17 | 0554 | 16 | 1947 | 15 | 0747 | 14 | 1747 |
| Full Moon | 24 | 0408 | 23 | 1252 | 21 | 2239 | 21 | 1008 |
| Last Quarter | 30 | 1918 | 30 | 0833 | 29 | 0159 | 28 | 2232 |

Because the earth's period of revolution about the sun (365.24+ days) is not evenly divisible by the moon's period of revolution about the earth (27.32+ days), the dates and times of lunar phases, moonrise and moonset, and tidal data must be recomputed for each year. The following information, however, is based on geometrical relationships and holds true for all times:

1. The New Moon rises at sunrise, crosses the meridian at noon, and sets at sunset.
2. The First Quarter Moon rises at noon, crosses the meridian at sunset, and sets at midnight.
3. The Full Moon rises at sunset, crosses the meridian at midnight, and sets at sunrise.
4. The Last Quarter Moon rises at midnight, crosses the meridian at sunrise, and sets at noon.

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